

Remarks:

A. Status of the Claims

Claims 1-30 and 46-47 were pending when the November 10, 2005, Office Action was mailed to Applicants, with claims 31-45 withdrawn. The claims have not been amended, and no claims have been added or canceled. Claims 1-30 and 46-47 are currently pending, with claims 31-45 withdrawn from consideration at this time.

B. The Obviousness Rejection Is Overcome

1. Summary of Rejection

Claims 1-30 and 46-47 are rejected under 35 U.S.C. § 103(a) as being obvious over Chem Abstract 128:41551 (“Chem Abstract”). In making the obviousness rejection, the Examiner appropriately concedes that “[t]he disclosure of the reference differs from the instant claims in that it does not disclose the claimed first polymerizable component nor the claimed specific species, as elected.” The Action, page 2. The Examiner essentially admits that the cited reference fails to disclose both components a) and b) of Applicants’ claimed invention. This alone, destroys the obviousness rejection. *Manual of Patent Examining Procedure* (MPEP) § 2142 (“To establish a *prima facie* case of obviousness...the prior art reference...must teach or suggest all the claim limitations”).

Despite these admissions, and contrary to prevailing U.S. patent law, the Examiner proceeds with unsupported arguments that Chem Abstract renders the claimed invention obvious. Specifically, the Examiner contends that “the reference does disclose that the thiophosphine is used as sensitizer in the composition form photographic material. That means another component must be present with a thiophosphine to form the product.” The Action, page 2. The Examiner fails to elaborate or present any evidence on what the “another component” is or encompasses. The Examiner also contends “[f]urther, the difference between the structure of the

claimed species and the reference is the aromatic ring with 3 repeating unit in the reference has attached a CF₃ group. However, it does not affect the mechanism to form the claimed products.” The Action, pages 2-3. From these unsubstantiated opinions, the Examiner concludes that that it would have been obvious “to one of ordinary skill in the art to select the first polymerizable component from [sic] the reference to react with thiophosphine to form a similar product, based on the same mechanism, in the absence of a showing of unexpected results derived from said selection.” *Id.* at page 3.

Applicants disagree with the Examiner’s conclusion. Claims 1-30 and 46-47 are not rendered obvious under 35 U.S.C. § 103(a) by Chem Abstract.

2. Standard for Establishing a *Prima Facie* Case of Obviousness Has Not Been Met

The Examiner has not established a *prima facie* case of obviousness. It is well settled that “[t]he examiner bears the initial burden of factually supporting any *prima facie* case of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness.” MPEP § 2142. Other than the unsubstantiated opinions of the Examiner identified above, the Examiner cites no passages in Chem Abstract, no additional references, and no other evidence (either extrinsic or intrinsic) to support the present obviousness rejection. The required evidence to support a *prima facie* case of obviousness has not been presented. *Id.* (“...the examiner must provide evidence which as a whole shows that the legal determination sought to be proved...is more probable than not”).

To establish a *prima facie* case of obviousness, the examiner must show: (1) the prior art reference teaches or suggests all of the claim limitations; (2) some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings; and (3) a reasonable

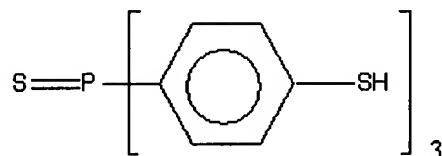
expectation of success. *Id.*; see also *In re Vaeck*, 947 F.2d 488 (Fed Cir. 1991). If any one of the three elements is missing, a *prima facie* case of obviousness cannot be maintained.

3. Summary of Applicants' Claimed Invention

Applicants presently claim:

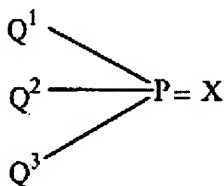
1. (original): A **polymerizable** composition comprising:
 - a) at least **one first polymerizable component** further defined as a monomer having at least two functional groups, the functional groups further defined as cyanato, isocyanato, thiocyanato, isothiocyanato, (meth)acryloyl, thio(meth) acryloyl, and/or episulfide radicals, and
 - b) at least one **second polymerizable component** further defined as:
 - i) thiophosphine monomers of **formula [I]**...: or
 - ii) prepolymers resulting from the polymerization of at least one of said thiophosphine monomers of formula (I) and at least one of said first polymerizable component.

Claim 1 (emphasis added); see also claims 29 and 46. The elected species of formula (I) is:



4. The Chem Abstract Reference Fails to Disclose Every Element of Applicants' Claimed Invention

The cited reference appears to concern a silver halide photographic sensitive material. Chem Abstract, Title (attached as Exhibit A is an automatic translation of the cited reference). The material "has the emulsion layer containing the silver halide grains chemically sensitized in the presence of the" following compound [sensitizer]:



wherein “Q1-Q3 is an aromatic group having a substituent having at least one of O, S, and N atom or an optionally substituted heterocyclic group and X is an Se, Te, or S atom.” Exhibit A, Abstract. There are at least 67 different sensitizers that are shown as being useful in the cited reference. *Id.* at pages 5-11.

When reviewing the cited reference, it becomes apparent that it fails to disclose every element of Applicants’ claimed invention. By way of example only, and as explained in further detail in the following subsections, Chem Abstract fails to disclose at least the following claimed elements:

- (i) A polymerizable composition;
- (ii) at least one first polymerizable component; and
- (iii) at least one second polymerizable component.

(i) Chem Abstract Fails to Disclose “A polymerizable composition”

In Chem Abstract, the silver halide grains appear to remain in particle form within the disclosed photographic sensitive material. Exhibit A, Abstract. Further, the sensitizer appears to be used to sensitize the silver halide grains and not as a polymerizable component. *Id.* In fact, there does not appear to be any disclosure in the cited reference that the photographic material is a polymerizable composition. The Examiner fails to present any evidence to the contrary—a burden that the Examiner carries. If the Examiner is relying on facts based on personal knowledge to support the existence of a polymerizable composition in the cited reference, Applicants request that the Examiner prepare an affidavit pursuant to 37 C.F.R. § 1.104(d)(2).

Because Chem Abstract does not appear to concern a “polymerizable composition,” the present obviousness rejection is improper and should be withdrawn.

(ii) Chem Abstract Fails to Disclose Applicants' Claimed "first polymerizable component"

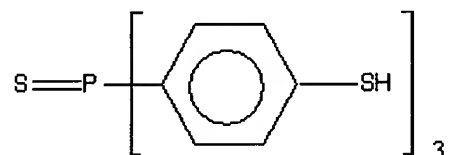
Chem Abstract fails to disclose Applicants' claimed "first polymerizable component" which includes "a monomer having at least two functional groups...further defined as cyanato, isocyanato, thiocyanato, isothiocyanato, (meth)acryloyl, thio(meth) acryloyl, and/or episulfide radicals." In fact, the Examiner admits this much. The Action, page 2 ("The disclosure of the reference differs from the instant claims in that it does not disclose the claimed first polymerizable component..."). This admission alone destroys the obviousness rejection.

Further, the Action's reasoning that "the reference does disclose that the thiophosphine is used as sensitizer in the composition form photographic material...means another component must be present with a thiophosphine to form the product" is pure conjecture and is supported by no evidence. In fact, the Examiner fails to identify or explain what "another component" is or encompasses. There is no citation by the Examiner to any passages in this reference disclosing a first component having Applicants' claimed functional groups.

Simply stated, Chem Abstract fails to disclose or suggest that the photographic material is a polymerizable composition—much less that the cited sensitizer could be copolymerizable with another monomer such as Applicants' claimed "first polymerizable component."

(iii) Chem Abstract Fails to Disclose Applicants' Claimed "second polymerizable component"

Chem Abstract fails to disclose Applicants' claimed "second polymerizable component" which currently includes the following elected formula (I):



The Examiner even admits this. The Action, page 2 (“The disclosure of the reference differs from the instant claims in that it does not disclose...the claimed specific species, as elected”).

Further, the Examiner’s reasoning that “the difference between the structure of the claimed species and the reference...does not affect the mechanism to form the claimed products” is supported by no evidence; it is pure speculation and misses the point which is that Chem Abstract fails to disclose Applicants’ claimed species. By making this type of argument, the Examiner is improperly avoiding his legal requirement of showing that Applicants’ claimed formula (I) is disclosed by the cited reference. MPEP § 2142 (“The examiner bears the initial burden of factually supporting any *prima facie* case of obviousness.”).

Because the cited Chem Abstract reference fails to disclose at least Applicants (i) polymerizable composition, (ii) at least one first polymerizable component, and (iii) at least one second polymerizable component, a *prima facie* case of obviousness has not been established.

5. There Is No Motivation to Modify the Chem Abstract Reference To Obtain Applicants’ Claimed Invention

A second element necessary to establish a *prima facie* case of obviousness requires a showing of a motivation to modify the Chem Abstract silver halide photographic sensitive material to include Applicants claimed invention. MPEP § 2142. This has not been done.

The Examiner fails to present any evidence that a person of ordinary skill in the art would be motivated to modify the cited reference’s photographic material to be a polymerizable material. In fact, the cited reference does not appear to include any discussion that the disclosed photographic material could be polymerizable.

The record is also devoid of any evidence that Chem Abstract discloses Applicants’ claimed “first polymerizable component...having at least two functional groups...as cyanato,

isocyanato, thiocyanato, isothiocyanato, (meth)acryloyl, thio(meth) acryloyl, and/or episulfide radicals”—much less a motivation to modify the reference to use such a component. In fact, the Examiner unsubstantiated opinion that “the reference does disclose that the thiophosphine is used as sensitizer in the composition to form photographic material...means **another component** must be present with a thiophosphine to form the product” is indicative of the lack of evidence; the highlighted text provides no suggestion or motivation to use Applicants’ claimed “first polymerizable component.” The fact that the cited reference may include “another component” is not evidence of a motivation to use Applicants’ claimed “polymerizable component...having at least two functional groups.” In fact, the Examiner cites no passages in Chem Abstract, no additional references, and no other evidence (either extrinsic or intrinsic) to support his position. There is no motivation to use Applicants’ claimed “first polymerizable component” found in the reference or the to a person of ordinary skill in the art upon reading this reference.

The Examiner similarly fails to present any evidence of a motivation to modify Chem Abstract’s disclosed sensitizer—which includes CF_3 groups—to include Applicants elected formula (I). There simply does not appear to be any discussion in Chem Abstract that the CF_3 groups on the cited sensitizer could be removed or what effect the removal of these groups would have. Similarly, the Examiner fails to argue—much less present the required supporting evidence—that a person of ordinary skill in the art would be motivated to modify the sensitizer disclosed in Chem Abstract to encompass the claimed species. See MPEP § 2142 (“The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination”). MPEP at § 2143.01.

Because there is no motivation to modify Chem Abstract to include Applicants claimed invention, a second element necessary to establish a *prima facie* case of obviousness has not been established.

6. There Is No Reasonable Expectation of Success That Modifying Chem Abstract To Include Applicants' Claimed Invention Would Work

In order to support the obviousness rejection, the Examiner is also required to show the existence of a reasonable expectation of success that modifying the photographic sensitive material in Chem Abstract to include Applicants' (i) polymerizable composition, (ii) first polymerizable component, and (iii) second polymerizable component would work. This has not been done.

The Examiner fails to present any evidence that such modifications to Chem Abstract would work. For instance, there does not appear to be any discussion in the Action or the cited reference of using Applicants' claimed first and second polymerizable components or whether such components would work. Additionally, no evidence has been presented that the cited sensitizer in Chem Abstract would continue to work if the CF₃ groups were removed. The record is simply devoid of any evidence showing that there is a reasonable expectation of success of modifying Chem Abstract to include Applicants claimed invention would work.

Because the Action fails to show all of the elements necessary to establish a *prima facie* case of obviousness, the present rejection cannot be maintained. Applicants request that this rejection of claims 1-30 and 46-47 under 35 U.S.C. § 103(a) as being obvious over Chem Abstract be withdrawn.

C. Conclusion

Applicants believe that this is a full and complete response to the Office Action mailed to Applicants on November 10, 2005.

Petition For A One-Month Extension of Time:

Pursuant to 37 C.F.R. § 1.136(a), Applicants petition for an extension of time of one month to and including March 10, 2006. Pursuant to 37 C.F.R. § 1.17, a check in the amount of \$120.00 is enclosed, which is the process fee for a one-month extension of time for a large entity status. If the check is inadvertently omitted, or should any additional fees under 37 C.F.R. §§ 1.16 to 1.21 be required for any reason relating to the enclosed materials, or should an overpayment be included herein, the Commissioner is authorized to deduct or credit said fees from or to Fulbright & Jaworski Deposit Account No. 50-1212/ESSR:068US.

Should the Examiner have any questions, comments, or suggestions relating to this case, the Examiner is invited to contact the undersigned Applicants' representative at (512) 536-3035.

Respectfully submitted,



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PATENT ABSTRACTS OF JAPAN

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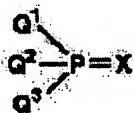
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(54) SILVER HALIDE PHOTOGRAPHIC SENSITIVE MATERIAL

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain high sharpness and high contrast and low fog performances by forming an emulsion layer containing silver halide grains chemically sensitized in the presence of a specified compound and a hydrophilic colloidal layer.

SOLUTION: This silver halide photographic sensitive material has the emulsion layer containing the silver halide grains chemically sensitized in the presence of the compound represented by formula and the hydrophilic colloidal layer on a support. In formula, each of Q1-Q3 is an aromatic group having a substituent having at least one of O, S, and N atom or an optionally substituted heterocyclic group and X is an Se, Te, or S atom. These silver halide grains are chemically sensitized in the presence of this compound formed into an average grain diameter of 0.01-10 μ m, and at that time, it is preferable that they have a silver iodobromide content of ≥ 90 mol% and an aspect ratio of ≥ 2.5 or a silver chloride content of ≥ 90 mol% and an aspect ratio of ≥ 1.5 .



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 CLAIMS

[Claim(s)]

[Claim 1] Silver halide photosensitive material characterized by having the emulsion layer and hydrophilic colloid layer containing the silver halide particle which carried out chemical sensitization to the bottom of the existence of a compound expressed with the following general formula (1) on a base material.
[Formula 1]

一般式(1)



Q1, Q2, and Q3 express among [type the heterocycle radical which may have the aromatic series radical or substituent which has a substituent containing at least one atom chosen from an oxygen atom, a sulfur atom, and a nitrogen atom, respectively, and X expresses a selenium, a tellurium, or a sulfur atom.]

[Claim 2] Silver halide photosensitive material according to claim 1 characterized by having made the compound expressed with said general formula (1) exist as a particle with a mean particle diameter of 0.01 micrometers - 10 micrometers, and carrying out chemical sensitization.

[Claim 3] Silver halide photosensitive material according to claim 1 or 2 with which said silver halide particle is characterized by being 1.5 or more aspect ratios more than at iodine-silver-bromide content 90 mol % at 2.5 or more aspect ratios or more than silver chloride content 90 mol %.

[Claim 4] Silver halide photosensitive material according to claim 1, 2, or 3 characterized by at least one layer chosen from said emulsion layer and a hydrophilic colloid layer containing a colloidal particle compound or its composite.

[Claim 5] Silver halide photosensitive material according to claim 1, 2, 3, or 4 characterized by at least one layer chosen from said emulsion layer and a hydrophilic colloid layer containing a disulfide compound.

[Claim 6] Silver halide photosensitive material according to claim 1, 2, 3, 4, or 5 characterized by at least one layer chosen from said emulsion layer and a hydrophilic colloid layer containing at least one compound chosen from a hydrazine compound and a tetrazolium compound.

[Claim 7] Silver halide photosensitive material according to claim 6 characterized by containing at least one compound which at least one layer chosen from said emulsion layer and a hydrophilic colloid layer contains a hydrazine compound, and is chosen from a bis-pyridinium compound and a phosphonium compound.

[Claim 8] Silver halide photosensitive material according to claim 1, 2, 3, 4, 5, 6, or 7 characterized by performing chemical sensitization of said silver halide particle to the bottom of existence of an oxidizer.

[Claim 9] Silver halide photosensitive material according to claim 1, 2, 3, 4, 5, 6, 7, or 8 characterized by having a conductive layer containing the particle of the metallic oxide chosen from tin and vanadium.

[Claim 10] Silver halide photosensitive material according to claim 1, 2, 3, 4, 5, 6, 7, or 8 characterized by including 10-8 to ten - three mols per one mol of silver halides of transition metal complexes which have at least one chosen from a halogen atom, a cyano group, a seleno cyano group, a tellurium cyano group, and a nitrosyl radical as a ligand into a silver halide particle.

[Claim 11] Silver halide photosensitive material according to claim 9 characterized by having said conductive layer and emulsion layer in this order, and having the layer which contains a color particle between this conductive layer and an emulsion layer or on an emulsion layer.

[Claim 12] Silver halide photosensitive material according to claim 1, 2, 3, or 8 characterized by having a crossing light filter layer and said emulsion layer to both sides of a base material at this order.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] About silver halide photosensitive material, this invention excels [contrast / sensibility and] in high shelf life with little fogging by use of a detailed specific chemical sensitizer, and relates to an especially suitable silver halide photosensitive material for the object for roentgenography, and printing platemaking with which the stable photograph engine performance is obtained under high-humidity/temperature.

[0002]

[Description of the Prior Art] Since the image of high sensitivity and high sharp nature can be obtained, silver halide photosensitive material is used widely.

[0003] For example, the sensitive material for roentgenography is what applied at least one-layer photosensitive silver halide photographic-emulsion layer on the film base material of the transparency colored blue, irradiates an X-ray at a patient and can obtain a patient's organization and the image of the bone architecture by exposing the transmitted light. In order to lessen a patient's X-ray dose of radioactivity as much as possible, a silver halide photographic-emulsion layer is usually prepared in both sides of a base material, light can be efficiently absorbed now, it inserts with the fast screen of two sheets, and that by which spectral sensitization is carried out so that it may expose in the orthochromatic light which emits light from this intensifying screen has spread today. Although, as for absorption, the front intensifying screen in an X-ray irradiation side carries out a part of X-ray, most results in the back intensifying screen which passes a film with two emulsion layers and absorbs the X-ray of the opposite side by the almost same ratio. Sensibility can improve by leaps and bounds with this technique, and the amount of contamination of an X-ray can be reduced.

[0004] However, in the sensitization by the intensifying screen, there is a fault in which graininess tends to get worse. It is ** ** to raise sharp nature, without degrading graininess by atomizing a silver halide particle with the high sensitivity-ized technique of a silver halide particle.

[0005] The silver halide photosensitive material for printing has the sensitive material for return which mounts the sensitive material for an output, an alphabetic character, and patterns, such as an imagesetter or a scanner, as a sensitive material for platemaking used in order to print a high-definition image, and carries out adhesion return ***** of the manuscript. FM screening for which the so-called frequency modulation which expresses concentration with the number of a minute dot is used has been used from the method with which laser dot outputs, such as an imagesetter, express concentration with area. For this reason, sensitive material with more high sharp nature is called for. moreover, the sensitive material for return mounts a pattern on an alphabetic character shank, and a lower alphabetic character can express it vividly -- being the so-called -- it extracts and quality improvement of character expression is called for. These techniques are fundamentally asked for the silver halide particle of fogging being lower than anything at high sensitivity.

[0006] Although the formation of long wavelength by part photopigment, i.e., orthochromatic-izing, pan clo-ization, etc. have been performed in the formation of a monotonous particle, and a spectral sensitization technique in a particle preparation technique for high-sensitivity-izing of a silver halide particle, since long wavelength-ization restricts the exposure light source, high sensitivity-ization of the silver halide particle itself is called for. Therefore, form a sensitivity speck in a silver halide particle, the photoelectron generated by optical exposure here is made to capture efficiently, and development of the chemical sensitization technique which amplifies a scale and the formed silver nucleus for accumulation of the complex ion between grids in a particle as the center of development here is positioned as an important technique.

[0007] Retrieval of the approach of carrying out chemical sensitization effective for a silver halide particle reaches far and wide. Conventionally, although the golden-sulfur sensitization technique by golden ion and the sulfur compound was in use, the sulfur compound was used as the selenium or the tellurium compound, and golden-selenium sensitization, golden-sulfur-selenium sensitization, etc. have been examined. Many patents whose things for which sensibility is raised were found out and used this approach are exhibited by carrying out minute amount use especially of the selenium compound. For example, JP,4-16838,A, 4-25832, 4-32831, 4-96059, No. 109240 [four to], 4-140738, 4-140739, 4-147250, 4-149437, 4-184331, 4-190225, No. 191729 [four to], 4-195035, 6-11791, 6-324427, 6-332093, 7-98483, 7-104415, No. 110554 [seven to] -- said -- 7-159927, 7-199387, and 7-140579 -- said -- it is indicated by 7-225447, 7-301880, No. 301879 [seven to], and the 7-333790 specification.

[0008] however -- although, as for the chemical sensitization which uses a selenium compound, sensibility becomes high -- fogging -- being easy -- things, that contrast becomes low, especially an elevated temperature -- highly humid -- fogging -- being easy -- the actual condition has not obtained the engine performance which there are faults, such as things, and should be satisfied. The phosphine SERENAIDO compound combined with the phosphorus atom in this had brought about the result comparatively good for high-sensitivity-izing.

[0009] [Problem(s) to be Solved by the Invention] This invention is made in view of the above-mentioned situation, and the purpose is in obtaining high sensitivity, the silver halide sensitive material for roentgenography with which the high sharp nature which used the silver halide particle of low fogging is obtained and high contrast, and the engine performance of low fogging, and offering ** GO repeatability and the silver halide photosensitive material for printing platemaking which extracted and was excellent in alphabetic character quality. Another purpose of this invention is shown in aiming at improvement in the shelf life of silver halide photosensitive material.

[0010]

[Means for Solving the Problem] The above-mentioned purpose of this invention is the silver halide photosensitive material which has the emulsion layer and hydrophilic colloid layer containing the silver halide particle which carried out chemical sensitization to the bottom of the existence of a compound (henceforth the sensitizer of this invention) expressed with the following general formula (1) on a base material, and [0011].

[Formula 2]

—(1)—



[0012] Q1, Q2, and Q3 express among [type the heterocycle radical which may have the aromatic series radical or substituent which has a substituent containing at least one atom chosen from an oxygen atom, a sulfur atom, and a nitrogen atom, respectively, and X expresses a selenium, a tellurium, or a sulfur atom.] The compound expressed with said general formula (1) was made to exist as a particle with a mean particle diameter of 0.01 micrometers - 10 micrometers, and carried out chemical sensitization, Said silver halide particles are 1.5 or more aspect ratios more than at iodine-silver-bromide content 90 mol % in 2.5 or more aspect ratios or more than silver chloride content 90 mol %, At least one layer chosen from said emulsion layer and a hydrophilic colloid layer contains a colloidal particle compound or its composite, At least one layer chosen from said emulsion layer and a hydrophilic colloid layer contains a disulfide compound, At least one layer chosen from said emulsion layer and a hydrophilic colloid layer contains at least one compound chosen from a hydrazine compound and a tetrazolium compound, At least one compound which at least one layer chosen from said emulsion layer and a hydrophilic colloid layer contains a hydrazine compound, and is chosen from a bis-pyridinium compound and a phosphonium compound is contained, It has a conductive layer containing the particle of the metallic oxide chosen from performing chemical sensitization of said silver halide particle to the bottom of existence of an oxidizing agent, tin, and vanadium, In a silver halide particle, as a ligand A halogen atom, a cyano group, a seleno cyano group, 10-8 to ten - three mols per one mol of silver halides of transition metal complexes which have at least one chosen from a tellurium cyano group and a nitrosyl radical are included, Therefore, it is attained by having said conductive layer and emulsion layer in this order, and having the layer which contains a color particle between this conductive layer and an emulsion layer or on an emulsion layer, and having a crossing light filter layer and said emulsion layer to both sides of a base material at this order.

[0013] In addition, a phosphine SERENAIDO compound is indicated by JP,6-19035,A and the 8-6200 specification, and although the compound which the Pentough Rollo phenyl group combined with the compound

and phosphorus atom which the phenyl group combined with the phosphorus atom is indicated, effectiveness of this invention cannot be acquired.

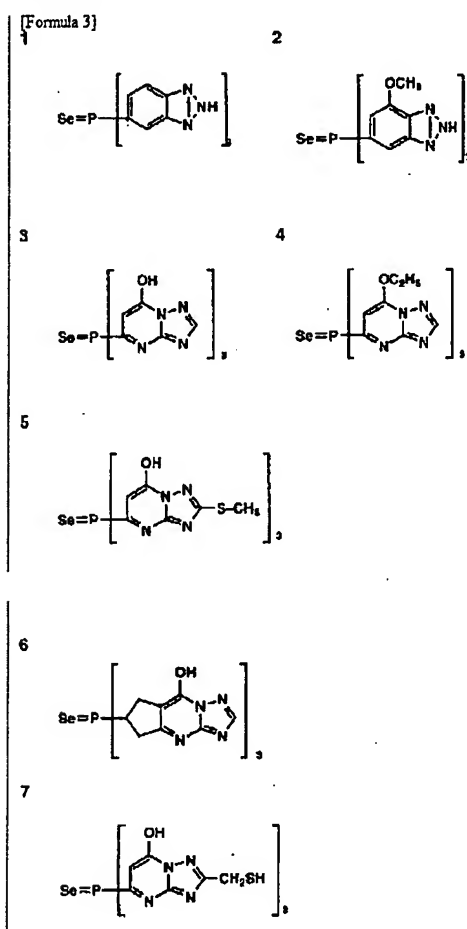
[0014] Hereafter, this invention is described in detail.

[0015] The aromatic series radical expressed with Q1, Q2, and Q3 in a general formula (1) is a radical of a monocycle or a condensed ring, and has as a substituent the radical containing at least one chosen from an oxygen atom, a sulfur atom, and a nitrogen atom on this ring, for example, a sulfhydryl group, a thioether radical, an alkoxy group, the amino group, a heterocycle radical, or aliphatic series residue with this heterocycle. The heterocycle radical expressed with Q1, Q2, and Q3 and the heterocycle radical as said substituent are heterocycle radicals of saturation or partial saturation, for example, a pyridyl radical, a furil radical, a piperidyl radical, a pyrrolidyl radical, a thienyl group, a pyrimidyl radical, a TETORAZA indene radical, a triazole radical, a benzotriazol radical, an imidazole group, the Benz imidazole group, a quinolyl radical, a thiazole radical, and a benzothiazole radical are mentioned. As for at least one of the radicals expressed with Q1, Q2, and Q3, it is desirable that a nitrogen atom, an oxygen atom, and a sulfur atom are contained two or more, and especially nitrogen atoms are desirable as they increase in number with 3 or more and 4 or more. The aliphatic series residue as said substituent has branching of carbon numbers 1-60, or the desirable residue of a straight chain. Ureido association, amide association, and sulfonamide association are sufficient as association with the phosphorus atom of the aromatic series radical expressed with Q1, Q2, and Q3, or a heterocycle radical besides a carbon to carbon bond. X expresses a selenium, a tellurium, or a sulfur atom.

[0016] Although the example of a compound expressed with a general formula (1) below is shown, it is not limited to these.

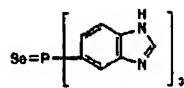
[0017]

[Formula 3]

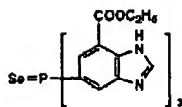


[0018]
[Formula 4]

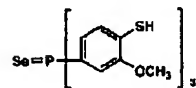
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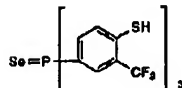
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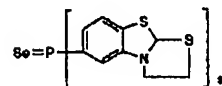
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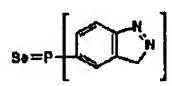
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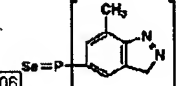
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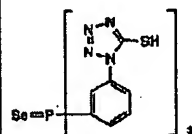


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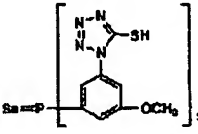


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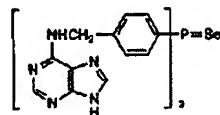
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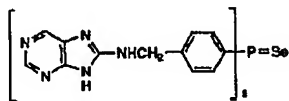
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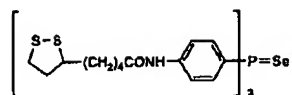
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[Formula 5]
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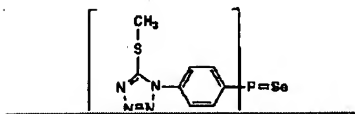
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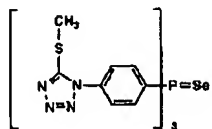
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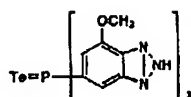
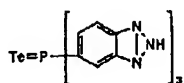


[0020]

[Formula 6]

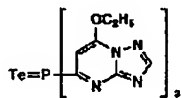
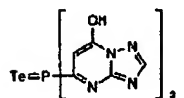
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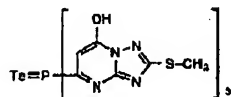


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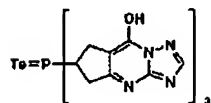
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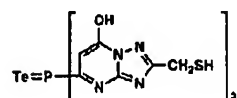
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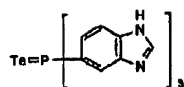
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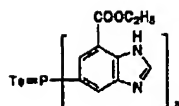
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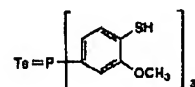
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[Formula 7]
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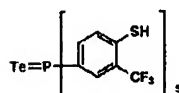
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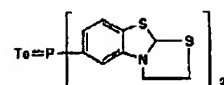
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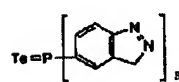
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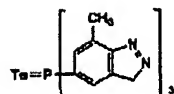
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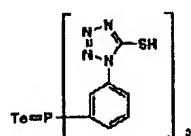
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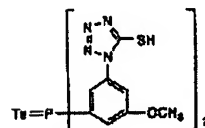
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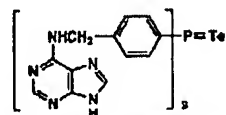
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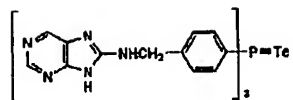
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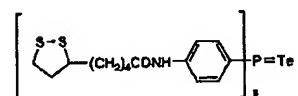
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[Formula 8]
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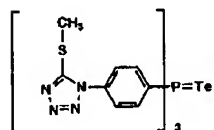
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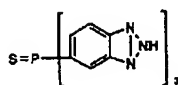


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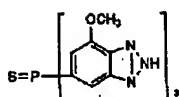


[0023]
[Formula 9]

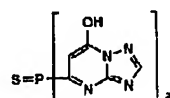
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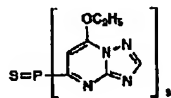
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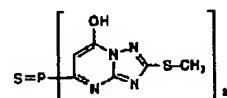
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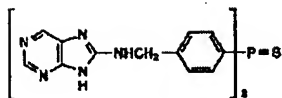
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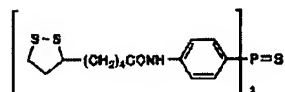
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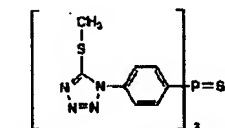
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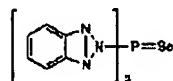
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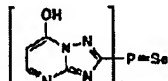
[0026]

[Formula 12]

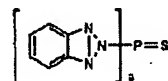
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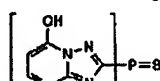
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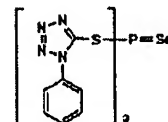
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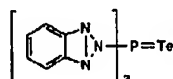
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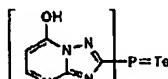
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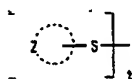


[0027] These compounds are compoundable according to the approach of a publication to JP,4-184331,A. Refer to the 757-785 pages with a volume [16th] of edition [of BAIRUSHUTAIN of issue / 4th] (Bernhard Prager, et al; Beilsteins Handbuch Der Organischen Chemie, Vierte Auflage) for the synthetic approach of a phosphorus compound in 1933. Phosphine SERENAIDO or phosphine tellurium NAIDO can be obtained by introducing a bromine or iodine atom into a raw material compound, compounding a phosphorus trichloride compound, and making this react with a hydrogenation selenium or a hydrogenation tellurium compound.

[0028] As a substituent of a compound, when active hydrogen etc. exists, after protecting this radical,

phosphorus-izing is desirable. It is desirable to introduce various kinds of radicals generally known as a protective group, and to remove, selenium-izing or after tellurium-izing. A Tori Flo Roar cetyl group, 4, and 4'-dimethoxy triphenylmethyl chloride radical or benzyl is mentioned as a desirable protective group. [0029] As for the sensitizer of this invention, it is desirable to use by 10-8 to ten - two mols per one mol of silver halides. Although you may dissolve in water, alcohol, or an organic solvent on the occasion of addition, it is more desirable to change into a particle condition and to add rather than melting and adding to an organic solvent. Although the particle diameter at the time of a particle condition may be arbitrary, it is good to add by 10 micrometers or less and further 0.001-5 micrometers preferably. In order to change into a particle condition, a ball mill, a sand mill, etc. can be used. The sensitizer of this invention is good to add before and after addition of a chemical sensitizer. the temperature of chemical sensitization -- 40-100 degrees C -- desirable -- 46-88 degrees C and pH -- 1-12 -- desirable -- 3-9 -- it is the range of 4-8 more preferably. By carrying out, adding and changing the chemical sensitization especially of the sensitizer of this invention into a particle condition, sensibility is further made high and fogging can be lowered. [0030] Moreover, it is desirable to be also able to use together a sensitizer, a spectral sensitization agent, etc. of this invention, to use together with a common fogging inhibitor, and to carry out chemical sensitization. A disulfide compound can be mentioned as a desirable fogging inhibitor. A disulfide compound has the desirable compound which especially - sulfhydryl group of a mercapto compound formed into the bis-object by the way including -S-S-association in the molecule. The general formula of a desirable disulfide compound is shown below.

[0031]



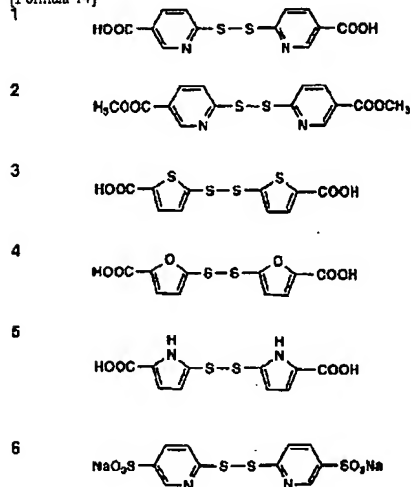
[0032] Z expresses among [type the aromatic series ring machine or heterocycle radical of 5 which may have a substituent - 8 members, respectively.]

As an aromatic series ring machine, a phenyl group or a naphthalene radical is desirable. As a heterocycle radical A pyridine radical, A pyrimidine ring, a pyrrole ring, a thiophene ring, a furan ring, etc. can be mentioned. this ring top -- a carboxylic-acid radical, a sulfonic group, and the carboxy alkyl group (carboxymethyl --) of carbon numbers 1-16 the alkoxy group (a methoxy group --) of the carbon numbers 1-16, such as carboxy chill carboxy butyl It can have substituents, such as alkylamino radicals (dimethylamino, dimethoxy ethoxy ** dicyano ethoxy ethylamino radical, etc.) of carbon numbers 1-16, such as an ethoxy radical and a butoxy radical, and alkyl groups (methyl, ethyl, butyl, octyl radical, etc.) of carbon numbers 1-16. [0033] A desirable example is shown below.

[0034]

[Formula 14]

[Formula 14]



[0035] It is desirable to make an oxidizer exist at the time of chemical sensitization. As an oxidizing agent, a hydrogen peroxide, chloramines, tetrazolium compounds, peroxides, and benzoquinones are mentioned. As for chloramines, what Krol does covalent bond to a nitrogen atom, is expressed with R-N-Cl-Na⁺, and is expressed with -Q-SO₂ as R is desirable, and Q expresses the aromatic series radicals and heterocycle radicals which may be permuted, such as a phenyl group, 2-methylphenyl, 4-methylphenyl radical, and a pyridine-2-IRU radical. There are chloramine T, o-chloramine T, chloramine B, chloramine red B, etc. as goods.

[0036] The examples of an oxidizer are enumerated below.

[0037] (1) A hydrogen peroxide (2) N-chloro, N-phenyl sodium salt (3) N-chloro, N- Sodium salt (2-methylphenyl) (4) N-chloro, N- Sodium salt (4-methylphenyl) (5) N-chloro, N- Sodium salt (4-methoxyphenyl) (6) N-chloro, N-naphthyl potassium salt (7) N-chloro, N- Sodium salt (Pyridine-2-IRU) (8) 2, 3, 5-triphenyl tetrazolium chloride (9) 2, 3-methoxyphenyl-5-phenyl tetrazolium chloride (10) sodium-persulfate (11) ammonium-persulfate (12) benzoyl-peroxide (13) 2, and 2'-azobis (isobutyronitrile) (14) Although the compound used as a high contrast-ized agent as 2, 3-dichloro -5, and a 6-dicyano-1, 4-benzoquinone (15) 1, 4-benzoquinone tetrazolium compound can be mentioned, especially, the compound of 2, 3, and 5-triphenyls may be desirable, and you may have the alkyl group of carbon numbers 1-16, an alkoxy group, an alkylamino radical, etc. as a substituent on a phenyl ring, respectively. If the sensitizer of this invention is used for the bottom of existence of the above-mentioned oxidizer, the effectiveness of this invention can be heightened further.

[0038] An oxidizer can be used to the sensitizer of this invention by the 10,000/1 million to 1 million times as many mole ratio as this. An addition stage has 1 second - less than 120 desirable minutes after [before adding a sensitizer] addition.

[0039] as the silver halide particle used for the silver halide photosensitive material of this invention -- 14 face pieces, eight face pieces, indeterminate form tabular, and a cubic -- although any are sufficient, a high sensitivity plate-like particle or a high high contrast cubic particle is used. Although a silver halide presentation can be used for arbitration, such as AgCl, AgClBr, AgClBrI, and AgClBrI, to quick processing, it is rich in AgCl, and salt iodine silver bromide with little iodine is desirable. In the case of about 0.01-1 micrometer and a monotonous particle, mean particle diameter is used preferably 0.05-0.6 micrometers. Here, mean particle diameter is expressed with the average volume particle diameter which is not concerned with a configuration, but once converts the volume of a particle into a ball, and is expressed for the diameter.

[0040] The monotonous particle is indicated by U.S. Pat. No. 4,439,520, said 4,425,425 numbers, said 4,414,304 numbers, etc., and can obtain the target particle easily. Moreover, a monotonous particle can make a specific surface part able to carry out epitaxial growth of the silver halide with which presentations differ, or can carry out shelling.

[0041] In case a monotonous particle is used, it is desirable that 50% or more of total of the projected area of all the particles of an emulsion layer is a 2.5 or more-aspect ratio monotonous particle. Such a desirable result is obtained that especially the rate of a monotonous particle increases to 60% to 70%, and 80 more% or more. An aspect ratio expresses the ratio to the distance between [of two] parallel flat surfaces of the diameter of circle which has the same area as the projected area of a monotonous particle. It can refer to the publication of U.S. Pat. No. 5,320,938 about a monotonous particle with many silver chloride components. Since the high silver iodide part below more than 0.001 mol %10% exists in the interior of a silver halide particle or that there is a silver nucleus raises the pressure resistance of a particle, it is desirable. An aspect ratio becomes a plate, so that it is large. Although the desirable thickness of a monotonous particle is 0.01-0.5 micrometers, it can be chosen as arbitration by setup of an aspect ratio and average volume particle diameter. Moreover, as for distribution of the particle size of a monotonous particle, it is desirable that the coefficient of variation (100 times of value S/D which broke the standard deviation S of the diameter at the time of carrying out circle approximation of the projected area by the average diameter D) often used is 20% or less of mono dispersion emulsion especially 30% or less. Moreover, a monotonous particle and a normal crystallite child are mixable two or more sorts. Two or more sorts of mixing is techniques often used as a means to adjust the contrast of a photograph.

[0042] Although it will become high sensitivity if silver-bromide content is large and an aspect ratio is generally high, fogging goes up and contrast falls. Although contrast will become high if silver chloride content is enlarged, sensibility falls. If the sensitizer of this invention is used, low fogging can be acquired by high sensitivity, being able to attain high sensitivity and maintaining high contrast with more than silver chloride content 90 mol % and a 1.5 or more-aspect ratio silver halide emulsion without causing the rise of fogging, and the fall of contrast with a more than silver-bromide content 90 mol % and 2.5 or more average aspect ratios silver halide emulsion.

[0043] High sensitivity is obtained especially in the combination of the sensitizer of a monotonous particle and this invention. It is explained since the light-receiving area of light is increased that that sensibility becomes high by the monotonous particle generally has a large projected area. However, as for surface area becoming large, the chemical sensitizer which turned [what / makes / many / fogging since a chemical sensitizer reacts on a front

face, and does not raise sensibility greatly in many cases] to the monotonous particle with the fact is needed. When the sensitizer of this invention is used for a monotonous particle, its sensibility is high, and it has the remarkable description that little fogging is.

[0044] In the cubic of a mold with many (100) silver chloride components beyond silver chloride content 55 mol %, it is difficult to raise sensibility by the particle. The technique which uses the dope and particle color of transition metals for a JP,5-11382,A specification not using a monotonous particle but using a silver halide particle 0.15 micrometers or less is indicated. This technique is used for the purpose of the technique which raises contrast rather than sensibility and raises concentration. Since a particle cannot raise contrast easily, the technique is examined variously. When mean particle diameter is 0.03-0.15 micrometers and silver chloride content carries out chemical sensitization of the cubic particle beyond 55 mol % using the sensitizer of this invention, there is the description from which contrast underfoot is high, and the so-called sharpness is high, and it extracts, and the high engine performance of alphabetic character quality is obtained. so that the content rate of a silver chloride is high -- general -- fogging -- easy -- there is an inclination for contrast underfoot to become low. However, this problem is conquerable if the sensitizer of this invention is used.

[0045] Preparation of a particle can choose acid process, a neutral process, the ammonia method, etc. suitably. Especially in case a metal is doped, it is desirable to carry out particle formation under the acidity of pH 1-5.

[0046] In order to control growth of a particle at the time of formation of a monotonous particle, ammonia, a thioether, a thiourea compound, a thione compound, etc. can be used as a silver halide solvent. For example, the annular OKISA thioether compound of a publication can be mentioned to an OKISA thioether compound given in the thioether compound of a German patent [No. 1,147,845] publication, JP,56-94347,A, and JP,1-121847,A, JP,63-259653,A, and 63-301939. What is indicated by the JP,53-82408,A specification especially as thiourea is useful.

[0047] Although it is desirable to add 1×10^{-8} to 1×10^{-1} - three mols per one mol of silver of metal atoms of five to eight groups of the periodic table at the time of physical aging and chemical ripening as for a silver halide particle, metal salts, such as zinc of non-transition metals, lead, and tin, etc. can be made to live together in this invention. Making iridium dope in 1×10^{-8} to 1×10^{-1} - three mols per one mol of silver, in order to acquire a high illuminance property is often regularly used in a silver halide emulsion, and it does not bar at all in this invention. Moreover, making transition-metals compounds, such as a rhodium, dope in 1×10^{-8} to 1×10^{-1} - three mols per one mol of silver, when obtaining the high contrast emulsion beyond gamma10 is often regularly used similarly in a silver halide emulsion. A ruthenium, an osmium, and a rhenium dope can be used instead of a rhodium dope. Although it is a technique indispensable for the ** room sensitive material for platemaking used by super-low sensibility to make transition metals dope, the difficulty of this technique is that contrast falls. Therefore, with this technique, it is used in order to obtain high sensibility and to acquire high contrast rather without a chemical sensitizer. However, contrast high enough was not acquired in an old sensitizer. In this invention, if the chemical sensitizer of this invention is used to transition metals and the silver halide particle which used the ruthenium, the osmium, and the rhenium especially, the high image of contrast underfoot will be obtained.

[0048] As for transition-metals compounds, such as a ruthenium, an osmium, and a rhenium, adding during silver halide particle formation is desirable. the approach and core shell structure which distribute homogeneity in a particle as an addition location -- carrying out -- the core section -- or there is the approach of carrying out many localization in the shell section. A result [make / it / often better / to exist in the shell section mostly] is obtained. Moreover, the approach of increasing abundance may be used as it becomes the outside of a particle continuously besides carrying out localization to discontinuous lamination. An addition can choose suitably the range of 10^{-8} to 10^{-1} - three mols per one mol of silver halides.

[0049] Although the example of the metal ion to dope is shown below, it is not limited to these.

[0050]
 (1) [Ru(CN)6]-4 (-- two --) -- [-- RuF -- (-- CN --) -- five --] - four -- (-- three --) -- [-- RuCl -- (-- CN --) -- five --] - four -- (4) -- [RuBr2(CN)4]-4(5) [Ru(NO) Cl5]-2 (6) -- [Ru(NO) I5]-2(7) [Ru(CN) Cl5]-2 (8) [Ru (CN) I5]-2(9) [Ru(SCN) Cl5]-2 -- (-- ten --) -- [-- Ru (SCN) -- I -- five --] - two -- (-- 11 --) -- [-- Ru (SeCN) -- Cl -- five --] - two -- (-- 12 --) -- [-- Ru (SeCN) -- I -- five --] - two -- (-- 13 --) -- [-- Ru (TeCN) -- Cl -- five --] - two -- (-- 14 --) -- [-- Ru (TeCN) -- I -- five --] - two -- (-- 15 --) -- [-- RuF -- two -- (-- CN --) -- four --] - four -- (-- 16 --) -- [-- RuCl -- two -- (-- CN --) -- four --] - four -- (-- 17 --) -- [-- RuI -- two -- (-- CN --) -- four --] - four -- (18) -- [Ru(NO) Br5]-2(19) [Ru(NO) F5]-2 (20) -- [Ru(CN) Br5]-2(21) [Ru(CN) F5]-2 (22) -- [Ru(SCN) Br5]-2(23) [Ru(SCN) F5]-2 (24) [Ru(SeCN) Br5]-2(25) [Ru(SeCN) F5]-2 (26) [Ru(TeCN) Br5]-2(27) [Ru(TeCN) F5]-2(28) and Re -- Furthermore, about other metals, such as Rh, Ir, Pd, and Pt, what transposed the part of Ru to them can be mentioned, and 6 seat ligand transition-metals compound can refer to JP,2-2082,A, 2-20853, 2-20854, 2-20855, etc. Moreover, although the common sodium salt as alkali complex salt, potassium salt, or a cesium salt can be chosen, you may make it the 1st, the 2nd, and the amine salt of the 3rd class. For example, it can express like K2 [RuCl6], 2 (NH4) [RuCl6], K4 [Ru2Cl10O (XH2O)], and K2 [RuCl5 (H2O)].

[0051] As a ligand of the transition metals doped in order to adjust sensibility and contrast in a silver halide particle, a halogen atom, a cyano group, a seleno cyano group, a tellurium cyano group, and a nitrosyl radical are desirable.

[0052] Since high contrast can be acquired and sensibility can be reduced, it is used, but the fall of contrast is remarkable when these have many amounts of dopes. It is not enough although the fall of this contrast is compensated with chemical sensitization, such as sulfur metallurgy. If the sensitizer of this invention is used for the silver halide photosensitive material for ** rooms, contrast can be made high, and can be extracted and alphabetic character quality can be raised. Moreover, although fogging in a safe light will tend to increase if a sensitizer is used, there are few increments in fogging at the sensitizer of this invention.

[0053] Sensitization of the silver halide particle can be carried out with the noble-metals salt like a sulfur compound metallurgy salt. Moreover, sensitization can be carried out combining these approaches. When carrying out sensitization with a noble-metals salt, the sensitization effectiveness can be heightened if the below-mentioned sensitizing dye is made to exist. Moreover, when adding these to an emulsion, if it is made the below-mentioned particle distribution and adds with coloring matter, the sensitization effectiveness can be heightened more. Moreover, AgI is formed in the grain child front face which carries out particle distribution of the AgI particle, and is added at the time of chemical sensitization, and the effectiveness of coloring matter sensitization can be heightened. At the time of AgI formation of a plate-like particle, contribution for the transition line part which attains to 1000 from several is often used.

[0054] The technique in which obtaining high sensibility raises damage resistance since a silver halide particle becomes weak to a pressure is needed. In this case, there are two kinds, the approach filled up with a soft binder and the approach filled up with a hard binder. Although damage resistance will become good in ** if filled up with a hard thing, a crack will arise. On the other hand, if shelling of the soft polymer is carried out to the surroundings of a hard inorganic substance, compatibility with gelatin becomes good and a crack can be improved. however, a hard inorganic substance -- this effect -- ***** -- effectiveness will be halved in **. Here, using the sensitizer of this invention, even if it uses an inorganic compound and its composite, pressure resistance can be improved. Since this will be captured by the sensitizer of this invention before the electron generated with a pressure serves as fogging in a certain operation, it can be considered.

[0055] In this invention, a colloidal particle is a thing 100nm or less, and the mean particle diameter of an inorganic substance can use it chemically [a large particle] or physically, making it a particle 100nm or less. For example, it is desirable to add inorganic colloidal silica, colloidal tin, colloidal zinc, colloidal titanium, a colloidal yttrium, colloidal PURASEOJUMU, neodymium, a zeolite, an apatite, etc. As a zeolite, ANARUSAITO, erionite, mordenite, the Shaba site, a GUMERI night, and a levynite are mentioned, and Zeolites A, X, Y, and L etc. are mentioned as permutite. Hydroxyapatite, a fluorine apatite, a chlorine apatite, etc. are mentioned as an apatite. A desirable addition can be added at 1 - 200% of a rate with weight per hydrophilic binder. Even if it adds in an emulsion by processing by the silane coupling agent, it is hard to condense the above-mentioned inorganic compound, and it can make coating liquid stability. Moreover, the crack by the inorganic compound can be prevented. As a silane coupling agent, TORIETOKI gardenia fruit llano vinyl, trimethoxy SHIRANO vinyl, trimethoxy propyl methacrylate, trimethoxy SHIRANO propyl glycidyl, a 1-mercapto-3-TORIETOKI gardenia fruit llano propane, a 1-amino-3-TORIETOKI gardenia fruit llano propane, TORIETOKI gardenia fruit llano phenyl, TORIETOKISHI methylsilane, etc. are mentioned. A silane coupling agent can raise a property rather than simple mixing by carrying out high temperature processing together with the above-mentioned inorganic compound. A mixing ratio is good to choose in 1:100-100:1.

[0056] What performed the polymerization of 1 - 24 hours for inorganic substances, such as colloidal silica and colloidal tin, at 20-100 degrees C preferably by polymerization initiators, such as sodium persulfate and ammonium persulfate, under existence of an acrylate monomer, a methacrylate monomer, a vinyl acetate monomer, etc., and performed shelling as a desirable composite can be mentioned. Distribute in a water solution, and a monomer makes sodium dodecylbenzenesulfonate, nonyl phenoxy sulfonic-acid sodium, etc. exist in 0.01 - 10% of the weight of the range, and is made to cover with an emulsion polymerization. The particle diameter after shelling has preferably desirable 10nm or more 10 micrometers or less at 1 micrometer or less. It is because coating liquid stability will deteriorate if small [if too large, a point failure will tend to break out at the time of spreading, and].

[0057] The one section and the 1 section of nonyl phenoxy sulfonic-acid sodium are added for sodium persulfate to a monomer below as an initiator, and the concrete composite which performed the emulsification covering polymerization of 8 hours at 80 degrees C is shown.

[0058] (1) It is the 20-% of the weight water-solution constituent of the copolymerization coating of the methyl-acrylate 10 section and the acrylic-acid 1 section to the colloidal silica 100 section.

[0059] (2) It is the 40-% of the weight water-solution constituent of the copolymerization coating of the hexyl acrylate 10 section and the acrylic-acid 1 section to the colloidal silica 100 section.

[0060] (3) It is the 30-% of the weight water-solution constituent of the copolymerization coating of the butyl acrylate 10 section, the ethyl acrylate 1 section, and the acrylic-acid 1 section to the colloidal silica 100 section.
 [0061] (4) the colloidal silica 100 section -- receiving -- the 25-% of the weight constituent of the copolymerization coating of the vinyl acetate 30 section, the butyl acrylate 4 section, the ethyl acrylate 1 section, and the acrylic-acid 1 section.

[0062] (5) It is the 15-% of the weight constituent of the copolymerization coating of the ethyl-acrylate 10 section and the acrylic-acid 1 section to the colloidal silica 100 section.
 [0063] Although the above-mentioned colloidal particle compound and a composite can be used for all of a hydrophilic colloid layer, they are preferably used for the layer which adjoins an emulsion layer and an emulsion layer, a protective layer, an antihalation layer, the particle color content layer for the improvement in safe light, etc. in the range of 0.01 - 3 g/m² in the range of 0.001 - 10 g/m² by solid content.
 [0064] Although there is the approach of considering as the approach of high-contrast-izing a silver halide particle, making a silver chloride content high, and narrowing distribution of particle diameter etc., in order to make it high contrast further, using a hydrazine compound and a tetrazolium compound as a high contrast-ized agent is known for the object for platemaking. High-contrast-izing of the part to which concentration is called the 0.2 or less leg 0.5 or less is [1.0 or more] important for especially high-contrast-izing especially with 2.5 or more high high-contrast-izing of the concentration section. high-contrast-izing of the leg -- the melanism of an alphabetic character image or a halftone dot -- since the boundary of the section and the white section is sharp, it is needed. The image of the sensitive material for an output is clear in this being sharp, the sensitive material for return extracts, and alphabetic character quality becomes high. For that, although there is also selection of a high contrast-ized agent, a silver halide particle must be high contrast at least. However, it is limited, even if it uses a silver halide particle as a silver chloride and narrows distribution of particle diameter. Even if a chemical sensitizer may raise sensibility, there is little what raises contrast. It is difficult to raise especially the contrast of the part of the leg. When it applies to the silver chloride particle which doped the transition metal complex which uses a ruthenium and an osmium and has a halogen and a cyano ** seleno cyano ** tellurium cyano ** nitrosyl ligand, it raises contrast, making especially the sensitizer of this invention into low sensibility, keeps being sharp and has the description which can obtain the image of alphabetic character quality.
 [0065] The hydrazine compound which can be used for the sensitive material of this invention is a compound which has a -NHNH-radical, and a typical thing can be expressed with the following general formula.
 [0066]

T may express an aryl group and a heterocycle radical among T-NHNHCO-V and a T-NHNHCOCO-V type, and these may have a substituent. As an aryl group expressed with T, it has including the benzene ring or a naphthalene ring. As a desirable substituent A straight chain, the alkyl group (desirable -- the methyl of carbon numbers 1-20, and ethyl --) of branching Alkoxy groups, such as an isopropyl group and n-dodecyl (carbon numbers 2-21 preferably) for example, aliphatic series acylamino radicals (what has the alkyl group of carbon numbers 2-21 preferably --), such as a methoxy group and an ethoxy radical For example, aromatic series acylamino radicals, such as an acetyl amino radical and a heptyl amino group, etc. are mentioned. The aromatic series ring which is not permuted [the above permutations or] contains what is combined by connection radical like -CONH-, -O-, -SO₂NH-, -NHCONH-, and -CH₂CHN- besides these, for example. V expresses a hydrogen atom, the alkyl groups (a methyl group, an ethyl group, butyl, TORIFURORO methyl group, etc.) which may be permuted, aryl groups (a phenyl group, naphthyl group, etc.), and heterocycle radicals (a pyridyl radical, a piperidyl radical, a pyrrolidyl radical, a furanyl radical, a thiophene radical, pyrrole radical, etc.).
 [0067] A hydrazine compound can refer to the publication of U.S. Pat. No. 4,269,929, and can compound it. A hydrazine compound can be made to contain in the hydrophilic colloid layer which adjoins the inside of an emulsion layer, or an emulsion layer, and the hydrophilic colloid layer of further others. A hydrazine compound can be dissolved in alcohols, such as a methanol and ethanol, ethylene glycol, ether, and ketones, and can be added. The range of 10-6 to ten - one mol per one mol of silver halides of the addition is 10-4 to ten - two mols preferably. Moreover, it can be used for the mean particle diameter of 0.01-10 micrometers as a particle part water spray solution with a sand mill, a ball mill, etc.

[0068] The compound of a desirable hydrazine is listed especially below.
 [0069] (1) 1-truffe ROROME chill carbonyl-2-{{[4- A phenyl]}} hydrazine (3-n-butyl ureido) (2) 1-truffe ROROME chill carbonyl-2-{{[4-2-2 -- 4-G tert pentyl phenoxy butyl amide] phenyl}} hydrazine (3)1- (2 --) 2 6, 6-tetramethyl piperidyl-4- amino-oxalyl-2-{{[4-2- (2 --) 4-G tert-pentyl phenoxy butyl amide] phenyl}} hydrazine (4)1- (2 --) 2 6, 6-tetramethyl piperidyl-4- amino-oxalyl-2-{{[4-2- (2 --) 4-G tert pentyl phenoxy butyl amide] phenyl sulfonamide phenyl}} hydrazine (5)1- (2 --) 2, 6, and 6-tetramethyl piperidyl-4-amino-oxalyl-2-{{[4-2- (2 --) 4-G tert pentyl phenoxy butyl amide] phenyl sulfonamide phenyl}} hydrazine (6)1- (2, 2, and 6 --) 6-tetramethyl piperidyl-4-amino-oxalyl-2- O [4-] 3-thia -6, and 9 and 12 -- 15- tetra--- OKISA tricosane amide

benzenesulfonamide phenyl hydrazine (7)1-(1-methylene carbonyl pyridinium)-2- (4- (3-thia -6 --)) 9, 12, 15-tetra-OKISA tricosane amide benzenesulfonamide phenylhydrazine chloride.

[0070] Especially the thing in which T has a sulfonamide phenyl group and V has a TORIFURORO methyl group as a substituent as a hydrazine compound is desirable. Moreover, when an oxalyl group combines with a hydrazine, especially the piperidyl amino group of V that may be permuted is desirable.

[0071] A hydrazine compound acts on high contrast-ization of the high concentration section, as mentioned above, but since high-contrast-izing of the leg is inadequate, the technique of using the oxidant of the developing agent generated at the time of development as an attempt which improves this is considered. The oxidant of a developing agent and the redox compound which reacts are made to exist, and the clear nature of an image is raised by making the inhibitor which controls the leg from this compound emit. Since generating of the oxidant of a developing agent is generated by advance of development, the reduction rate of a particle is related. Since this effectiveness can be heightened if the center of development with an early reduction rate is formed by the chemical sensitizer, a good chemical sensitizer is called for. Remarkable effectiveness can be obtained in case a redox compound will be used, if the sensitizer of this invention is used.

[0072] A redox compound has hydroquinone, catechols, naphth hydroquinone, aminophenols, pyrazolidone, hydrazines, and reductones as a redox radical. A desirable redox compound is a compound which has a -NHNH-radical as a redox radical, and the following general formula can show a typical thing.

[0073]

T and V express the radical of the above-mentioned hydrazine compound and homonymy among a T-NHNHCO-V-(Time) n-PUGT-NHNHCOCO-V-(Time) n-PUG type. PUG expresses a photograph usefulness radical, for example, 5-nitroindazole, 4-nitroindazole, 1-phenyl tetrazole, 1-(3-sulfophenyl) tetrazole, 5-nitro bends triazole, 4-nitrobenzo triazole, 5-nitroimidazole, 4-nitroimidazole, etc. are mentioned. These development control compounds are further connectable with CO part of T-NHNH-CO- through N or the hetero atom of S through direct or (Time) the alkylene expressed, phenylene, aralkylene, and an aryl group through hetero atoms, such as N and S. In addition, what introduced development control radicals, such as triazole, indazole, an imidazole, a thiazole, and CHIAJIA oar, into the hydroquinone compound which the ballast radical attached can be used. for example, 2- (dodecyl ethyleneoxide thio propionic-acid amide-5-(5-nitroindazole-2-IRU) hydroquinone --) 2- (stearyl amide)-5-(1-phenyl tetrazole-5-thio) hydroquinone, 2 - (2, 4-G t-amyl FENO propionic-acid amide-5-(5-nitro triazole-2-IRU) hydroquinone, 2-dodecyl thio-5-(2-mercapto thio thiadiazole-5-thio) hydroquinone, etc. are mentioned.) In addition, n expresses 1 or 0. A redox compound can refer to the publication of U.S. Pat. No. 4,269,929, and can compound it. A redox compound can be made to contain in a hydrophilic colloid layer through an interlayer further among the hydrophilic colloid layer which adjoins the inside of an emulsion layer, or an emulsion layer. A redox compound can be dissolved in ketones, such as ester, such as glycols, such as alcohols, such as a methanol and ethanol, ethylene glycol, and triethylene glycol, propylene glycol, the ether, dimethylformamide, dimethyl sulfo oxide, a tetrahydrofuran, and ethyl acetate, an acetone, and a methyl ethyl ketone, and can be added. Moreover, mean particle diameter can distribute to arbitration what can melt neither into water nor an organic solvent easily by 0.01-6 micrometers by high-speed impeller distribution, sand mill distribution, ultrasonic distribution, ball mill distribution, etc. In distribution, surface active agents, such as an anion and Nonion, a thickener, a latex, etc. can be added, and it can distribute to it.

[0074] A desirable redox compound is listed especially below.

[0075] (1) 1- (4-nitroindazole-2-yl-carbonyl)-2-{{4-(3-n-butyl ureido) phenyl}} hydrazine (2)1-(5-nitroindazole-2-yl-carbonyl)- 2-{4-[2- (2 --) 4-G tert pentyl phenoxy butyl amide] phenyl} hydrazine (3)1-(4-nitro triazole-2-yl-carbonyl)-2-{4-[2-(2, 4-G tert pentyl phenoxy) butyl amide] phenyl} hydrazine (4) 1- (4-nitroimidazole-2-yl-carbonyl)-2-{4-[2- (2 --) 4-G tert pentyl phenoxy butyl amide] phenyl sulfonamide phenyl} hydrazine (5)1-(1-sulfophenyl tetrazole-4-methyl oxazole)-2-{3-[1-phenyl-1'-p-chlorophenyl methane thio GURISHI NAMIDO phenyl] sulfonamide phenyl} hydrazine (6)1-(4-nitroindazole-2-yl-carbonyl)-2-{{4 - (octyl - tetra-ethyleneoxide-thio-glycinamide phenyl-sulfonamide phenyl}} hydrazine.)

[0076] The example of a tetrazolium compound is shown below.

[0077] (1) 2, 3-JI (p-methylphenyl)-5-phenyl tetrazolium chloride (2) 2, 3-JI (p-ethyl phenyl)-5-phenyl tetrazolium chloride (3) 2, 3, 5-tree p-methylphenyl tetrazolium chloride (4) 2, 3-diphenyl -5 - (p-methoxypheny tetrazolium chloride (5) 2) [3-JI (o-methylphenyl)-5-phenyl tetrazolium chloride] (6) 2, 3, 5-tree p-methoxypheny tetrazolium chloride (7) 2, 3-JI (o-methylphenyl)-5-phenyl tetrazolium chloride (8) 2, 3-JI (m-methylphenyl)-5-phenyl tetrazolium chloride (9) -- 2, 3, and 5-tree p-ethoxy methylphenyl tetrazolium chloride - these can use the publication of JP,5-58175,B for reference, and can also be used together with a hydrazine compound depending on the case.

[0078] When using a hydrazine as a high contrast-ized agent, an amine compound is used in order to strengthen

a reduction operation of a hydrazine. A typical amine compound can be expressed with the following general formula containing at least one nitrogen atom.

[0079] R-N(Z)-Q or -- R, Q, Z, and W in a R-N(Z)-L-N(W)-Q type express the alkyl group by which carbon numbers 2-30 may be permuted. Moreover, these alkyl group chains may be combined with hetero atoms, such as nitrogen, sulfur, and oxygen. R, Z, or Q and W may form the ring of saturation and partial saturation mutually. L expresses a divalent connection radical. Hetero atoms, such as sulfur, oxygen, and nitrogen, may be contained in this connection radical. A sulfur atom is not limited, especially although the carbon number in the connection radical of L is possible to 200 and 1-20, and the oxygen atom of 1-30, and a nitrogen atom are 1-40.

[0080] It is shown below as an example of an amine compound.

[0081] (1) Diethylamino ethanol (2) Dimethylamino -1, 2-propanediol (3) 5-amino-1-pentanol (4) Diethylamine (5) Monomethylamine (6) Triethylamine (7) Dipropyl amine (8) 3-dimethylamino-1-propanol (9) 1-dimethylamino-2-propanol (10) Screw A thioether (Dimethylamino tetra-ethoxy) (11) Screw A thioether (Diethylamino pentaethoxy) (12) Screw A thioether (Piperidino tetra-ethoxy) (13) Screw A thioether (Piperidino ethoxyethyl) (14) Screw A thioether (NIPEKCHIN diethoxy) (15) Screw The ether (Dicyano ethylamino diethoxy) (16) Screw The ether (Diethoxy ethylamino tetra-ethoxy) (17) 5-dibutyl aminoethyl carbamoyl benzotriazol (18) 5-morpholino ethyl carbamoyl benzotriazol (19) 5-(2-methylimidazole-2-ethylene) carbamoyl benzotriazol (20) 5-dimethylaminoethyl ureylene benzotriazol (21) 5-diethylaminoethyl ureylene benzotriazol (22) 1-diethylamino-2-(6-aminopurine) ethane (23) 1-(dimethylaminoethyl)-5-mercapto tetrazole () [24] As a 1-piperidino ethyl 5-mercapto tetrazole (25) 1-dimethylamino-5-mercapto tetrazole (26) 2-mercapto-5-dimethylaminoethyl thio thiadiazole (27) 1-mercapto-2-morpholino ethane amine compound Especially the thing for which at least one piece and thioether association have [a piperidine ring or a pyrrolidine ring] at least one piece and at least two ether linkage in a molecule is desirable.

[0082] A pyridinium compound and a phosphonium compound are used besides an amine compound as a compound which promotes a reduction operation of a hydrazine. An onium compound sticks to the silver halide particle charged in the negative charge since positive charge is worn, and it is thought by promoting the electron injection from the developing agent at the time of development that high contrast-ization is promoted. Therefore, these operations also differ by the method of chemical sensitization. That by which the effectiveness of sensibility or contrast is demonstrated more by this onium compound and chemical sensitization is desirable. The sensitizer of this invention shows remarkable effectiveness also especially to this onium compound.

[0083] Refer to the bis-pyridinium compound of JP,5-53231,A and a 6-242534 specification for a pyridinium compound desirable to this invention.

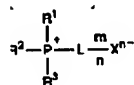
[0084] Especially a desirable pyridinium compound is connected by the 1st place of pyridinium, or the 4th place, and forms the bis-pyridinium object. The ion which a salt has has a chlorine ion or desirable 4 fluoride boron ion, although halogen anions, such as a chlorine ion and bromine ion, 4 fluoride boron ion, perchloric acid ion, etc. are mentioned. A desirable bis-pyridinium compound is shown in the following.

[0085] (1) The 1 and 1'-dimethyl -4, 4'-bipyridinium dichloride (2) 1, and 1'-dibenzyl -4, 4'-bipyridinium dichloride (3) 1, and 1'-diheptyl -4, 4'-bipyridinium dichloride (4) 1, and 1'-G n-octyl -4, 4'-bipyridinium dichloride (5) 4 and 4'-dimethyl -1, 1'-bipyridinium dichloride (6) 4, and 4'-dibenzyl -1, 1'-bipyridinium dichloride (7) 4, and 4'-diheptyl -1, 1'-bipyridinium dichloride (8) 4, and 4'-G n-octyl -1, To 1'-bipyridinium dichloride (9) screw (4 and 4'-diacetoamide -1, 1'-tetramethylen pyridinium) dichloride this invention, as a desirable phosphonium compound JP,7-244350,A, 7-234473, 7-261310, 7-270956, and a 7-270957 specification can be referred to.

[0086] Especially a desirable phosphonium compound can mention an alkyl group, an alkoxy group, the amino group, an aryl group, a heterocycle radical, etc. as a substituent with the structure which four substituents which may differ attached to the phosphorus atom. Furthermore, a bis-phosphonium compound can be raised as a desirable phosphonium compound.

[0087] The general formula of a desirable phosphonium compound is shown below.

[0088]



[0089] As for the inside R1, R2, and R3 of [type, an alkyl group, a cycloalkyl radical, an aryl group, an alkenyl radical, a cyclo alkenyl radical, and heterocycle residue may be expressed respectively, and these may have a substituent. m may express an integer, L may express the organic radical of m ** combined with P atom, n may express the integer of 1-3, X may express the anion of n **, and X may connect with L.]

As an example of a radical expressed with R1, R2, and R3 The straight chain of the carbon numbers 1-24, such as a methyl group, an ethyl group, butyl, a hexyl group, an octyl radical, dodecyl, and an octadecyl radical, or the alkyl group of branching, Heterocycle residue, such as cycloalkyl radicals, such as a cyclohexyl radical and cyclopentenyl, a pyridyl radical, a quinolyl radical, a furil radical, an imidazolyl radical, a thiazolyl radical, a benzothiazolyl radical, a mol HORINIRU radical, a pyrimidyl radical, and a pyrrolidyl radical, a phenyl group, Aryloxy groups, such as aryl groups, such as a naphthyl group and a phenantolyl group, a phenoxy group, p-chloro phenoxy group, and p-truffe ROROME chill phenoxy, are mentioned. As an example of a substituent, halogen atoms, such as a fluorine atom, a chlorine atom, a bromine atom, and iodine atom, the nitro group, 1, the 2 or 3rd class amino group, the carbamoyl group, the sulfonamide radical, the sulfamoyl group, the hydroxyl, the sulfoxy radical, the sulfonyl group, the carboxyl group, the sulfonic group, cyano group, and carbonyl group other than a radical which are expressed with R1, R2, and R3 are mentioned.

[0090] As an example of an anion expressed with X, halogen ion, such as a chlorine ion, bromine ion, and iodine ion, acetate ion, OKISA rate ion, fumarate ion, benzoate ion, sulfate ion, perchloric acid ion, nitrate ion, p-toluene SURUHONETOI-on, methanesulfonate ion, butane sulfonate ion, etc. are mentioned.

[0091] In this invention, the 4th class onium salt is added and used for at least one layer of the silver halide emulsion layer of photosensitive material, or other hydrophilic colloid layers. What is necessary is just to add as a water solution at a silver halide emulsion solution or a hydrophilic colloid solution as a solution of the organic solvent which can mix with water, such as alcohols, ester, and ketones, in the case of water-insoluble nature in a water-soluble case, in order to make the 4th class onium salt contain in photosensitive material. Moreover, when not melting into these organic solvents, with a ball mill, a sand mill, a jet mill, etc., it can be made a particle with a magnitude of 0.01-10 micrometers, and can add the scale (τ) which hung 100 on the value which was so good that it was narrow as for distribution of particle diameter, and broke the standard deviation (S) of particle diameter by mean particle diameter (D) -- it comes out, and it is expressed ($\tau = (\sigma/D) \times 100\%$) and this value of less than 40% and less than 20 more% is desirable. The approach of particle distribution can apply preferably the technique of solid-state distribution of the color which is a photograph additive.

[0092] The example of a desirable phosphonium compound is shown below.

[0093] (1) Triphenyl propyl phosphonium chloride (2) Triphenyl BENZOIRUMECHIRU phosphonium star's picture (3) Triphenyl ASETOMECHIRU phosphonium iodide (4) Triphenyl ethyl phosphonium toluenesulfonate (5) Tributyl ethyl phosphonium OKISARETO (6) Tridodecyl ethyl phosphonium sulfonate (7) Triphenyl benzyl phosphonium chloride (8) Tori (4-methoxyphenyl)-n-hexyl phosphonium chloride (9) Tori (4-chlorophenyl) phenoxy phosphonium chloride (10) triphenoxy phenyl phosphonium chloride (11) 1 -- 4-JI (triphenyl phosphonium) butane chloride (12) Triphenyl-2-butene phosphonium chloride (13) Tetrapod Phosphonium chloride (p-truffe ROROME chill phenyl) (14) Triphenyl phenoxy phosphonium chloride (15) 1, 6-JI Hexane chloride (Triphenyl phosphonium) (16) 1, 5-JI [Tori (p-truffe ROROME chill phenoxy) Phosphonium] pentane chloride (17) 1, 8-JI [Tori (p-chloro phenoxy) phosphonium] octane chloride (18) 1, 8-JI (triphenoxy phosphonium) octane chloride (19) 1, the hydrazine compound used for 8-JI (triphenoxy phosphonium) octane chloride (20) tetra-phenoxy phosphonium chloride this invention, It is desirable to contain 1×10^{-6} to 5×10^{-2} - two mols per one mol of silver halides as an addition of an amine compound, a pyridinium compound, a phosphonium compound, a tetrazolium compound, and a redox compound, and 1×10^{-4} to 2×10^{-2} - two mols are especially desirable. It is easy to adjust the addition of these compounds and to make gamma or more into eight whenever [high contrast-ized]. gamma can be further adjusted by the mono dispersion nature of an emulsion, the amount of the rhodium used, chemical sensitization, etc. gamma is taken as the concentration difference over the difference of the light exposure which gives concentration 0.1 and 3.0.

[0094] Antistatic finish is carried out, since silver halide photosensitive material will make dust adhere and the defect of an image will produce it, if electrified, or in order to avoid becoming an image noise by the so-called generating of an unnecessary mark and a static mark by discharge light etc.

[0095] Although antistatic finish occurs 2 passage of the permanent antistatic finish by which after what disappears by processing, and processing is maintained, permanent antistatic finish is carried out increasingly in recent years. As one of them, there is a technique which uses metallic-oxide particles, such as a vanadium oxide and tin oxide. Although activity is lower than the metal itself, in order that the particle of a metallic oxide may adsorb various kinds of inhibitors, a halogen particle and competitive adsorption set it and it affects the photograph engine performance. Since the effect which is controlling the photograph engine performance by effect of that remainder is also included after emitting cull KOGEN, as for a chemical sensitizer, this effect also needs to take into consideration especially a cull KOGEN emission mold chemical sensitizer. By the particle in which this invention carried out chemical sensitization, effect has few descriptions under the effect of the photograph engine performance, especially high-humidity/temperature in use of a metallic oxide. The example of desirable conductive metallic oxide is shown below.

[0096] (1) tin oxide: -- the mean particle diameter of 60nm / (2) containing 1% indium dope tin-oxide: -- the mean particle diameter of 90nm / (3) containing 1% phosphorus dope tin-oxide: -- the mean particle diameter of 120nm / (4) containing 0.5% antimony dope tin-oxide: -- the mean particle diameter of 112nm / (5) containing

2% indium dope vanadium-oxide: -- mean-particle-diameter (6) vanadium-oxide [of 60nm]: -- in order to heighten the effectiveness of this invention further the mean particle diameter of 134nm, describe installation of the layer containing the color particle described below. Shelf life can be raised preparing a particle color layer between an emulsion layer and the layer of conductive metallic oxide, or by preparing a color particle layer on an emulsion layer. Although the operation which adsorbs the remainder when the particle of the color charged in negative exists, after emitting cull KOGEN of a chemical sensitizer electrically, and stabilizes it about this can be considered, the detailed device is unknown.

[0097] As for the color used for a color particle layer, what has an acid nucleus is desirable. The oxo-Norian color and benzylidene color which have the radical of a carboxylic acid or its salt as an acid nucleus are desirable. It can choose from ARIRIDEN, oxo-Norian, hemi oxo-Norian, merocyanine, a styryl color, etc. An ARIRIDEN color and an oxo-Norian color are especially desirable. An ARIRIDEN color has the desirable hula NIRIDEN color which permuted a benzylidene color and its benzene ring by the furan ring especially. the alkyl group (for example, a methyl group --) which may be permuted on the aromatic series ring of these colors, or heterocycle An ethyl group, butyl, an octyl radical, a hydroxyethyl radical, a hydroxy ethoxyethyl radical, A cyano ethyl group, an aryl group (a phenyl group, a naphthyl group, thiophenyl radical, etc.), An alkoxy group (a methoxy group, an ethoxy radical, a propoxy group, butoxy radical, etc.), Various kinds of radicals (a phosphoric acid, boric acid, etc.) containing carboxy alkyl groups (a carboxymethyl radical, a carboxy ethyl group, carboxy butyl, etc.), a halogen atom (chlorine, fluorine), or a metal atom can be introduced into arbitration. When it is made easy to melt too much, fixing [of a color] becomes inadequate, the photograph engine performance is affected, and shelf life is made to deteriorate, although it is arbitrary to introduce a sulfonic group and a phosphoric-acid radical in order to make it easy to melt into water. It is because it moves to another layer from the layer which the color dissolved and fixed to moisture with high-humidity/temperature. In order to control this migration, the thing of whether it dissolves by 7.5 or more pH without dissolving by seven or less pH, and the structure to decolorize is desirable. If there is no decolorization capacity, it will become color muddiness by relation with the blueness color currently used after a development for tints, such as remaining color ***** and a medical-application base material. Then, the color of the conditions which can be fixed by seven or less pH and can fix the dissolution or the discharge of a color by 7.5 or more pH by the particle color is needed. In order to be poorly soluble by seven or less pH at water and to be fusibility by 7.5 or more pH, it is useful that the carboxyl group is introduced into the aromatic series part and heterocycle part of a color.

[0098] Although there are degradation of the photograph engine performance, degradation of physical properties, especially degradation of a remaining color by decomposition of a color at the time of preservation under high-humidity/temperature when an oxo-Norian color and a benzylidene color are used Since the light absorption capacity of a color will be heightened and effectiveness with sufficient shelf life will be acquired if the silver halide particle in which this invention carried out chemical sensitization is used, a color particle is used for antihalation or a crossing light filter layer between a base material and an emulsion layer, or it is suitable for using it for the upper layer of an emulsion layer as an object for safe lights.

[0099] The example of the desirable color used as a particle is shown below.

[0100] (1) 4-[4-JI (Methyl) an amino pyrazolone [benzylidene]-3-carboxy ethyl-1-[(4-sulfonic acid) phenyl]] (2) 4-[4-JI (cyano ethyl) amino benzylidene]-3-carboxy ethyl-1-[(4-sulfonic acid) phenyl] pyrazolone (3) 4-[4-JI (Cyano ethyl) amino benzylidene]-3-methyl-1- [-- A phenyl] pyrazolone (4-sulfonic acid) (4) 4-[4-JI (Isopropyl carboxy) Amino benzylidene]-3-methyl-1-[(4-sulfonic acid) phenyl] pyrazolone (5) 4-[4-JI (methyl) amino benzylidene]-3-methyl-1-[(4-sulfonic acid) phenyl] pyrazolone (6) 4-[4-JI (Methyl) benzylidene]-3-methyl-1- [- A phenyl] pyrazolone (3, 5-disulfon acid) (7) 4-[4-JI (Methyl) amino-alpha-TORIFURORO methylamino oxalyl benzylidene]-3-carboxy ethyl-1- [(3, 5-disulfon acid) phenyl] -- pyrazolone (8) 4-[4-JI (ethyl) amino benzylidene]-3-carboxymethyl-1- [-- A phenyl] pyrazolone (4-sulfonic acid) (9) 4-[4-JI (Isopropyl carboxy) amino benzylidene]-3-sulfonic-acid methyl-1-[(4-sulfonic acid) phenyl] pyrazolone (10) 4-(5-BUROMOFURIRIDEN-alpha-methyl carbamoyl)-3-carboxy ethyl-1- [-- A phenyl] pyrazolone (4-sulfonic acid) (11) 4-[4-JI (Methyl) an amino-alpha-piperidino amino carbamoyl CHIOFENIRIDEN-1-IRU]-3-carboxy ethyl-1-[(4-sulfonic acid) phenyl] pyrazolone -- (12) 4-[4-chloro-alpha-methyl sulfamoyl benzylidene]-3-carboxy ethyl-1- [-- A phenyl] pyrazolone (4-sulfonic acid) (13) -- 4-[4-TORIFURORO-alpha-methoxy ethyl carbamoyl benzylidene]-3-carboxy ethyl - the 1-[(4-sulfonic acid) phenyl] pyrazolone (14) 4-[4-JI (cyano ethyl) amino benzylidene]-3-methyl -1 - [-- (4-sulfonic acid) The phenyl] pyrazolone (15) 4-[3-TORIFURORO methyl-dimethyl carbamoyl benzylidene]-3-methyl-1-[(4-sulfonic acid) phenyl] pyrazolone above-mentioned color It is desirable to make it a particle with a mean particle diameter of 0.01-10 micrometers by the atomization machine mentioned later, and to fix in a color layer, and it is desirable as an addition that optical density uses it in the range of 0.05 to 3.0 concentration by maximum wave length.

[0101] Spectral sensitization of the silver halide particle to which chemical sensitization of this invention was carried out can be carried out. the spectral sensitization coloring matter which can mention cyanine, carbocyanine, dicarbocyanine, compound cyanine, a hemicyanine, SUCHIRIRU coloring matter, merocyanine, compound merocyanine, Jolo Pau Ra coloring matter, etc., and is used in this industry as desirable spectral

sensitization coloring matter -- single -- business -- or it can be used together and used. [0102] Especially useful coloring matter is cyanine dye, merocyanine coloring matter, and compound merocyanine coloring matter. It can be valid for these coloring matter in all of the nucleus usually used for cyanine dye as the basic heterocyclic nucleus. Namely, a pyrroline nucleus, an oxazoline nucleus, a thiazoline nucleus, a pyrrole nucleus, an oxazole nucleus, A thiazole nucleus, a selenazole nucleus, an imidazole nucleus, a tetrazole nucleus, The nucleus which the aromatic hydrocarbon ring united with nucleus; which the alicyclic hydrocarbon ring united with pyridine nuclei and these nuclei, and these nuclei, That is, they are an India renin nucleus, a bends INDO renin nucleus, the Indore nucleus, a benzoxazole nucleus, a naphth oxazole nucleus, a benzothiazole nucleus, a naphth thiazole nucleus, benzoselenazole nucleus, a benzimidazole nucleus, a quinoline nucleus, etc. These nuclei may be permuted on a carbon atom. [0103] 5 to 6 member heterocyclic nucleus, such as a pyrazoline-5-ON nucleus, a thiohydantoin nucleus, 2-thio oxazolidine -2, 4-dione nucleus, thiazolidine -2, 4-dione nucleus, a rhodanine nucleus, and a thiobarbituric acid nucleus, is applicable to merocyanine coloring matter or compound merocyanine coloring matter as a nucleus which has keto methylene structure.

[0104] Those combination may be used although these sensitizing dye may be used independently. The combination of sensitizing dye is often especially used for the purpose of a strong color sensitizing. [0105] In order to make these sensitizing dye contain in a silver halide emulsion, they may be distributed in a direct emulsion, or it may dissolve in independent or the mixed solvent of solvents, such as water, a methanol, propanol, methyl cellosolve, 2, 2 and 3, and 3-tetrafluoro propanol, and you may add to an emulsion. Moreover, JP,44-23389,B, 44-27555, 57-22089, etc. make an acid or a base live together like a publication, it may consider as a water solution or what surfactants, such as sodium dodecylbenzenesulfonate, were made to live together like a publication in U.S. Pat. No. 3,822,135, said 4,006,025 numbers, etc., and was used as the water solution or the colloidal dispersion object may be added to an emulsion. Moreover, after dissolving in real waterworks, such as phenoxylethanol, and a nonmiscible solvent, water or the thing which carried out hydrophilic colloid distribution may be added to an emulsion. JP,53-102733,A and 58-105141 may be directly distributed in hydrophilic colloid like a publication, and the distributed object may be added to an emulsion. [0106] The various photograph additives used for this invention can be used being able to make it water at a particle crystallized state in a poorly soluble case, and making it able to distribute in water, gelatin, a hydrophilic property, or a hydrophobic polymer, although you may melt and use it for a water solution or an organic solvent. In order to distribute a color, coloring matter, a hydrazine compound, a redox compound, a fogging inhibitor, an ultraviolet ray absorbent, etc. by this invention, it can distribute by the well-known disperser. Specifically, a ball mill, a sand mill, a colloid mill, an ultrasonic disperser, and a high-speed impeller disperser are mentioned. Although these photograph additives distributed in this invention have the desirable particle which has the average grain size of 100 micrometers or less, they are usually used with the mean particle diameter of 0.02-10 micrometers.

[0107] How to carry out high-speed churning mechanically as the distributed approach (JP,58-105141,A), The approach excluding [adding to the gelatin or the hydrophilic polymer by which the heating dissolution was carried out and the wetting agent and the defoaming agent went this into the organic solvent] the organic solvent dispersedly (JP,44-22948,A), How to carry out crystal deposit distribution of what was melted in acids, such as a citric acid, an acetic acid, a sulfuric acid, a hydrochloric acid, and a malic acid, into the polymer of pH 4.5-7.5 (JP,50-80119,A), It can melt to alkali, such as a sodium hydroxide, a sodium hydrogencarbonate, and a sodium carbonate, and the approach (JP,2-15252,A) of carrying out crystal deposit distribution etc. can be applied to polymers, such as gelatin of pH 4.5-7.5. For example, the hydrazine compound which cannot melt into water easily can refer to a JP,2-3033,A specification, can melt it, and can apply this approach to other additives. Moreover, the color which has carboxyl, sensitizing dye, an inhibitor, etc. can gather the rate of immobilization of a particle crystal taking advantage of the chelate capacity of a carboxyl group. That is, it is desirable by adding calcium ion, magnesium ion, etc. in a 200-4000 ppm hydrophilic colloid layer to make it a poorly soluble salt. If a poorly soluble salt can be formed, it will not limit using other salts. Applying to a sensitizer, a color, an inhibitor, an accelerator, a high contrast-ized agent, a high contrast-ized assistant, etc. is made as for the particle distribution approach of a photograph additive to arbitration according to the chemical physical property. [0108] In this invention, in order to control sensibility and safe light nature, desensitizing dye can be used. Especially the thing for which desensitizing dye is used in production of ** room sensitive material is useful. The range of 10mg - the 5g per one mol of silver halides of the amount of the organic desensitizer used is 50mg - 3g preferably. It adds in a water solution, and also it may dissolve in an organic solvent and the addition approach may be added. Moreover, it can be made a particle by the sand mill, the ball mill, or impeller distribution, and can add. Although the magnitude of 0.001-20 micrometers is suitable for the magnitude of a particle, especially desirable conditions are 0.01-1 micrometer. An organic desensitizer is characterized with the half-wave potential of a polarograph. That is, the sum of the anode potential and cathode potential of a polarograph is forward. This measuring method is indicated by the U.S. Pat. No. 3,501,307 specification. [0109] The mat agent which can be used for this invention may use a polymethyl methacrylate or a diacid-ized

cay as a principal component, and the front face may change a presentation by the organic or inorganic surface treatment agent. Moreover, the mean particle diameter of a mat agent can be chosen in 0.1-30 micrometers. Distribution of particle diameter has a desirable method of mixing two or more kinds of mono dispersion, and obtaining whenever [target mono dispersion], although powder is probably sufficient also as mono dispersion. It can ask for whenever [mono dispersion / of a mat agent] with the application of whenever [mono dispersion / of a silver halide].

[0110] As for the surfactant used for distribution, spreading assistant, or antistatic agent of the various additives used for this invention, an anion and the Nonion system are used preferably. As basic structure of a surface active agent, there are alkyl sulfo succinate, alkylbenzene sulfonic acid and an alkyl phenoxy alkylene oxide sulfonate, an alkyl sulfonate, etc., these alkyl groups have the desirable range of carbon numbers 2-30, and 4-16 are used especially preferably. Specifically Dodecylbenzenesulfonic acid, a nonyl phenoxy ethylene oxide sulfonate (n= 4), sulfo ***** (2-ethylhexyl ester sodium salt and a dinonyl phenoxy ethylene oxide sulfonate (n= 12) --) Undecyl carboxylic amide polyethylene oxide (n= 5), triisopropyl naphthalene sulfonic-acid sodium salt, The 1-methyl -1, 1-screw (3, 5-tert-amyl-2-phenoxy deca ethylene NOKISAIDO (n= 10)) methane, Perphloro octyl sulfonic-acid sodium, perphloro octyl carboxylic-acid sodium, polysulfone acid sodium (degree of polymerization 500,000), and a polystyrene maleic-acid copolymer (degree of polymerization 200,000) are mentioned.

[0111] The safe light disposition top color the silver halide photosensitive material of this invention is made to contain, Sensitizing dye, fogging inhibitor, hydroquinone, and hydroquinone mono-sulfonate, Antioxidants, such as resorcinol and a catechol, a globular form with a mean particle diameter of 1-20 micrometers, Mat agents, such as a silica of an indeterminate form, and a methyl methacrylate, the tin which carried out minute amount doping of an indium or the phosphorus, The compound of others, such as thickeners, such as antistatic agents, such as metal metallurgy group oxide, such as titanium, vanadium, zinc, copper, silver, and palladium, with a molecular weight of about 50,000 to 1 million polystyrene sulfonate, and a styrene maleic acid, and a development modifier, is combined with the application and the engine performance of using, and can be chosen suitably. Moreover, the alkali fusibility mat agent used when unnecessary after development can also be used. This contains the carboxyl group solubilized with alkali, and derivatives, such as homopolymers, such as a maleic acid and an acrylic acid, a styrene-maleic-acid copolymer, and a methyl-methacrylate-methacrylic acid, are in a polymer.

[0112] The lamination of the silver halide photosensitive material of this invention has the photosensitive emulsion layer of at least one layer on a base material. A protective layer can be prepared on a photosensitive emulsion layer. An emulsion layer and a protective layer can be further divided more than two-layer. Moreover, an interlayer is installed between a protective layer or an emulsion layer, diffusion of an additive and transparency of light can be controlled or chemical or physical effect of an adjacent layer can be suppressed. In order to intercept the safety light, a filter color is fixable to a protective layer. For immobilization, it can be made a particle, the ionic bond of an anion-cation can be used, or the redox reaction decomposed by oxidation or reduction can be used. It is good for the improvement in image quality to fix a color to the lower layer of an emulsion layer, or the opposite side of a base material for antihalation. As for an antihalation layer, preparing in the lower layer of an emulsion layer is desirable. When preparing the emulsion layer more than two-layer, the high emulsion of photosensitivity or development nature may be prepared in a place distant from the approach of carrying out near to a base material side. Since the reaching light decreasing and osmosis of a developer are overdue, and image quality will improve if sensibility prepares the quick high emulsion layer of development nature, the side near a base material is preferably applicable. A development anaphase uses the redox compound which emits a development restrainer, in order to carry out rate accommodation, since the difference of development nature becomes large. In order to heighten the effectiveness of the development restrainer emitted from a redox compound, it is desirable to make the layer in which a redox compound exists adjoin an emulsion layer through an interlayer. Concrete lamination is the order of the glue line / crossing light filter layer from a base material, or an antihalation layer / emulsion layer / interlayer / redox content layer / protective layer. Moreover, it can be used from a base material also in order of a glue line / crossing light filter layer, or an antihalation layer / redox content layer / interlayer / emulsion layer / protective layer. The gelatin used for these layers is good to adjust molecular weight or to use a bridge formation accelerator, in order to make a bridge construct over stratification, although it can be made to swell in a well-known cross linking agent. Usually, the amount of gelatin of each class used is 0.1 - 2.0 g/m². As for a cross linking agent, it is desirable to carry out 0.01-1 millimol use per gelatin 1g. Hydrophilic polymers, such as dextrans, starch, and grape sugar, and the hydrophobic latex other than gelatin can be introduced into each class, and a degree of swelling can be adjusted. As a degree of swelling, even the 120 to 200th place is common. Desiccation of each class adjusts temperature and time amount according to the vapor rate of moisture. Generally 0.1 - 200 seconds is applied as 25-200 degrees C and time amount as temperature. A degree of swelling is dipped underwater, and it can measure under

a microscope or can ask for it with a degree of swelling plan. The value which hung 100 on the swollen 23-degree C underwater ratio (L_w/L_d) of thickness L_w as a degree of swelling to desiccation thickness $=L_d$ (it is the thickness after 24-hour gas conditioning at 23 degrees C and 50% of relative humidity) can be made into an index.

[0113] the following developing agent of a hydrophilic colloid layer which is further alike at least and is used for a developer can be made to contain for the promotion of development of the silver halide photosensitive material of this invention. Moreover, they are N-methyl-iso thiazole-3-ON and N as an antifungal agent. - Methyl-iso thiazole-5-chloro-3-ON, the N-methyl-iso thiazole -4, 5-dichloro-3-ON, 2-nitro-2-bromine-3-hydroxy propanol, 2-methyl-4-chlorophenol, etc. can be used.

[0114] For carrying out coincidence spreading of two or more three to ten layers configuration layers at the high speed of 1000 meters from per [30] minute, U.S. Pat. No. 3,636,374, a well-known slide hopper type given [this] in a No. 3,508,947 specification, or curtain spreading can be used. In order to lessen nonuniformity at the time of spreading, it is desirable to lower the surface tension of coating liquid or to use said hydrophilic polymer which can give the thixotropicality to which viscosity falls according to shearing force.

[0115] A backing layer can be prepared in the silver halide photosensitive material of this invention. It is common to face to prepare a backing layer and to prepare a glue line / antistatic layer / color content layer / protective layer on a base material. After applying a vinylidene-chloride copolymer and a styrene-glycidyl acrylate copolymer by the thickness of 0.1-1 micrometer on the base material which carried out corona discharge, the gelatin layer, the acrylic or the methacrylic polymer layer, or non-acrylic polymer layer containing the particle of tin oxide with a mean particle diameter of 0.01-1 micrometer which doped an indium and Linn, and 5 vanadium oxides can be applied and obtained. Moreover, by the cross linking agent of an aziridine or a carbonyl active type which mentioned above the styrene sulfonic acid and the maleic-acid copolymer, film formation can be carried out and it can prepare. A color layer can be prepared on these antistatic layer, and it can consider as a backing layer. Inorganic [for dimension stability] or compound packing, the silica of adhesion prevention, a silicon system slipping agent or a remover for control of a methyl-methacrylate mat agent and conveyance nature, etc. can be made to contain in a backing layer by the compound colloidal silica which covered the front face of colloidal silica and also colloidal silica with non-acrylate polymers, such as methacrylate, an acrylate polymer or a styrene polymer, and acrylamide, etc. A benzylidené color and an oxo-Norian color are used as a backing color. These alkali fusibility or a resolvability color can be made into a particle, and it can also fix. As concentration for antihalation, it is desirable that they are the concentration from 0.1 to 2.0 on each photosensitive wavelength

[0116] the case where the antistatic agent used for the backing layer can be used also for an emulsion layer side, and there are the protective layer and two layers of protective layers of the emulsion upper layer -- which layer -- or -- adding in both layers ****. It can be used for an antihalation layer, an inhibitor emission layer or a timing layer of an emulsion lower layer, etc.

[0117] Since the sensitive material of this invention can obtain high sensibility, it is useful also to the sensitive material for roentgenography of medical application. Although to be high sensitivity is demanded in order that the sensitive material for roentgenography of medical application may reduce a patient's dose of radioactivity, it is required for improvement in diagnostic ability that sharp nature should also be high. Although it has composition which absorbs the crossing light which passes a base material from the light and the opposite side which usually establish a crossing light filter layer in base material both sides, and are reflected in respect of a base material in order to make sharp nature high, sensibility falls by this absorption. By use of the sensitizer of this invention, the high sensitivity silver halide particle which can attain reduction of a dose of radioactivity and both of improvement in sharp nature can be obtained.

[0118] The photosensitive material of this invention can be dried with the application of the desiccation theory in chemical engineering. Since it changes with properties of sensitive material, how to give the humidity when drying needs to choose suitably. It is because early desiccation often makes fogging high, or shelf life is deteriorated enough and the engine performance is degraded.

[0119] An approach well-known as an approach of packing the silver halide photosensitive material of this invention can be used. Since silver halide photosensitive material is weak to heat and humidity, avoiding is [saving by the severe condition] desirable. Generally, it is good to save at 30 degrees C from 5 degrees C. Humidity is good to carry out between 35% and 60% with relative humidity.

[0120] Spreading desiccation is carried out and the sensitive material of this invention can improve the core set of a base material by carrying out heat-treatment the back.

[0121] The processing liquid which develops the silver halide photosensitive material of this invention can be used together with superadditivity developing agents other than hydroquinone, such as hydroquinone,

hydroquinone sulfonic-acid sodium, and KURORU hydroquinone, such as pyrazolidone, such as 1-phenyl-3-pyrazolidone, the 1-phenyl -4, 4-dimethyl-3-pyrazolidone, 1-phenyl-4-methyl-4-hydroxymethyl-3-pyrazolidone, and 1-phenyl-4-methyl-3-pyrazolidone, and N-methyl para-aminophenol sulfate, as a developing agent. Moreover, reductone compounds, such as an ascorbic acid and isoascorbic acid, can also be used together with the above-mentioned superadditivity developing agent without using hydroquinone.

[0122] As preservatives, as a sodium-sulfite salt, a potassium sulfite salt, and a buffer A sodium-carbonate salt and a potassium carbonate salt, As a chelating agent, ethylenediaminetetraacetic acid (EDTA), EDTA and 2Na, EDTA, 4Na, etc. as a fogging inhibitor or a silver sludge inhibitor 5-methyl benzotriazol, 2-mercaptobenzothiazole, 1-phenyl-5-mercapto tetrazole, 6-nitrobenzimidazole, 1-(4-carboxylic-acid phenyl)-5-mercapto tetrazole, 1-(4-sulfonic-acid phenyl)-5-mercapto tetrazole, 2-mercaptobenzimidazole, A 2-mercapto-5-sulfonic-acid-benzimidazole 2-mercapto-4-hydroxy pyrimidine, 2-mercapto-4-hydroxy - Diethanolamine, triethanolamine, a diethylamino propanediol, etc. can be included as 5, 6-dimethylpyrimidin, and an accelerator. In addition, it can add in silver halide photosensitive-material layers, such as an emulsion layer and an emulsion protective layer, and a fogging inhibitor can raise not only fogging control but sharp nature, and ** GO repeatability. A developer can adjust a developer in the range of pH 9-12 by alkali chemicals, such as a sodium hydroxide and a potassium hydroxide. Generally, adjustment of pH can also be used by pH 11**0.5 as an object for quick processing, although shelf life is used in [good] 10**0.5. A development can be carried out within 20-40 degrees C and the processing condition for 1 - 90 seconds. Moreover, the amount of supplements of a developer or a fixer can be made into less than [the range of 5-216 cc per two, or this] 1m using an accelerator or a sensitizer, respectively. The amount reduction of supplements has especially the effective thing for which the amount of the silver halide particle used is reduced with the sensitization technique of an emulsion, can be used together with the above-mentioned development promotion technique, and can be attained.

[0123]

[Example] Although an example is given and this invention is hereafter explained to a detail, the mode of this invention is not limited to this.

[0124] It added agitating a preparation>> one-mol % [of an example 1 <<silver halide emulsion] silver-nitrate water solution, and the mixed halide solution (all halide being totaled including each halide by the mole ratio according to a silver halide presentation ratio, and it being one-mol %) containing three sorts, a sodium chloride, a potassium bromide, and a potassium iodide, in the gelatin water solution which contains an adenine at 0.002-mol %, and particle formation was performed with the double jet process until required particle diameter was obtained at 38 degrees C. The potential under particle formation doubled pH with pAg8.0 and 2.0. It desalted by having repeated the flocculation 3 times by the oligomer of a diisopropyl naphthalene sulfonic acid after that, and 32g of gelatin was added, pAg was doubled with 7.5 and pH was doubled with 5.5. This emulsion is hit one mol of silver, 3.3xten - six mols of chloroauric acid, 4xten - six mols of sodium thiosulfates, and 1.2xten - six mols of chemical sensitizers are added, respectively, chemical sensitization processing is performed for 48 minutes at 58 degrees C, and it is 4-hydroxy-6-methyl as a stabilizer. - 1, 3, 3a, and 1.5xten - three mols per one mol of silver of 7-tetraaza indenenes were added. Temperature is made into 40 degrees C after that. As orthochromatic cyanine dye 5 and 5'-dichloro-9-ethyl -3, 3-screw (3-sulfopropyl)-OKISA carbocyanine sodium salt (1.6x10 -four mols /, one mol of silver) 1 And 3-diethyl-6-TORIFURORO methyl-2-[3-(1, 3-diethyl-6-TORIFURORO methyl)-1 and 3-dihydro-2H-Benz imidazo-roux 2-ylidene-1-propenyl] 1H-Benz imidazolium (3.3x10 -five mols /, one mol of silver), as a stabilizer -- the 4-hydroxy-6-methyl -1, 3 and 3a, and a 7-tetraaza indene (1.5x10 -three mols /, one mol of silver) -- in addition, each emulsion of a publication was obtained to Table 1.

[0125] Evaluation>> of <<preservation sensibility Each emulsion was applied so that a **** hit silver content might be set to 3.0g on the polyethylene terephthalate base material which performed the under coat of transparent gelatin. After leaving this sample under 48% of humidity for 8 hours, by dividing into two, it packed on the black polyethylene sheet with a thickness of 20 micrometers, and one side is 25 degrees C and another side was saved for three days at 60 degrees C, respectively. This sample was exposed by the tungsten light source through the step wedge, it was 28 degrees C about development, and for 6 seconds, for 6 seconds, rinsing was carried out at 25 degrees C, and the deed development of the desiccation was carried out for fixing for 6 seconds at 60 degrees C for 6 seconds by 28 degrees C with the developer and fixer of the following presentation. The ultrasonic vibrator (200W and 200kHz) was made to exist in liquid for development and promotion of fixing. Desiccation was performed by adopting a 600W far-infrared heater.

[0126]

(Developer

presentation)

Hydroquinone 30g 1-phenyl-3-pyrazolidone 1.5g Isoascorbic acid 30g 5-nitroindazole 0.250g 1-phenyl-5-mercapto tetrazole 0.06g 5-methyl benzotriazol 0.06g 2-mercapto Benz imidazole-5-sulfonic acid 0.3g Potassium bromide 3.0g Sodium sulfite 50g Potassium hydroxide 30g Boric acid 10g N-n-butyl diethanolamine 15g Disodium ethylenediaminetetraacetate 1.0g Water was added, it considered as 1l., and pH was adjusted to 10.20.

[0127]

(Fixer

presentation)

An ammonium thiosulfate (72.5%) water solution 240ml Sodium sulfite 17g Sodium acetate and 3 monohydrate 6.5g Boric acid 6.0g A sodium citrate and 2 monohydrate 2.0g Acetic acid (90% water solution) 13.6ml Sulfuric acid (50% water solution) 4.7g Aluminum sulfate 26.5g (water solution whose aluminum₂O₃ conversion content is 8.1%)

Water was added, it considered as 1l., and pH was adjusted to 5.0.

[0128] The logarithm of the light exposure which gives the concentration of concentration fogging +0.1 was made into sensibility. Moreover, at the time of chemical sensitization, the chemical sensitizer of the eight sections was added in the water of the 100 sections, and it distributed by the sand mill, and evaluated similarly about the emulsion which used what was made into the particle of the mean particle diameter shown in Table 1.

A result is shown in Table 1.

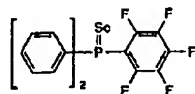
[0129]

[Table

1]

試料 No.	nd+化銀乳劑		化学増感劑			保存条件			
	組成	平均粒子径 μm	化合物 No.	有無	機粒子化 平均粒子径 (μm)	25℃、3日		60℃、3日	
						感度	加7'リ	感度	加7'リ
(1) 比較	30/70/0	0.12	比較	無	-	100	0.07	86	0.10
(2) 本發明	30/70/0	0.12	1	無	-	120	0.05	119	0.06
(3) 本發明	30/70/0	0.12	3	無	-	127	0.05	125	0.06
(4) 本發明	30/70/1	0.12	5	無	-	124	0.05	121	0.06
(5) 本發明	30/70/1	0.12	8	無	-	121	0.05	119	0.06
(6) 本發明	30/70/1	0.12	12	無	-	118	0.05	115	0.06
(7) 本發明	30/70/1	0.12	23	無	-	115	0.05	112	0.06
(8) 本發明	30/70/1	0.12	34	無	-	112	0.05	110	0.06
(9) 本發明	30/70/1	0.12	1	有	0.11	138	0.04	138	0.05
(10) 本發明	40/60/0	0.12	3	有	0.12	136	0.04	136	0.05
(11) 本發明	60/40/0	0.12	3	有	0.11	137	0.04	136	0.05
(12) 本發明	70/30/0	0.12	3	有	0.12	135	0.04	134	0.05
(13) 本發明	80/10/0	0.12	3	有	0.11	132	0.04	130	0.05
(14) 本發明	98/02/0	0.12	3	有	0.12	130	0.04	128	0.05
(15) 本發明	70/29/1	0.12	8	有	0.12	136	0.04	134	0.05
(16) 本發明	40/60/1	0.08	3	有	0.12	126	0.04	126	0.05
(17) 本發明	60/40/1	0.09	5	有	0.11	127	0.04	126	0.05
(18) 本發明	70/30/0	0.08	8	有	0.12	125	0.04	124	0.06
(19) 本發明	80/10/0	0.06	12	有	0.11	122	0.04	120	0.05
(20) 本發明	98/02/0	0.05	15	有	0.12	128	0.04	128	0.03
(21) 本發明	100/0/0	0.08	15	有	0.12	125	0.04	124	0.05

[0130]



[0131] When that the engine performance in which fogging is low is obtained by high sensitivity, and a chemical sensitizer are used making it into a particle if this uses the chemical sensitizer of this invention, it turns out that the still higher sensitization effectiveness is acquired.

[0132] The average aspect ratio prepared the monotonous particle silver halide emulsion of 1-8 like the example 1 except having changed pAg at the time of example 2 particle preparation by 0.2 units from 7 to 11. The rate of a monotonous particle carried out the same evaluation as an example 1 using the emulsion which checked with the electron microscope that it is 80% or more of total of the projected area of all particles, and that the coefficient of variation of mean particle diameter was less than 12%. A result is shown in Table 2.

[0133]

[Table 2]

試料 No.	測定		平均粒子径		化学物質類別	化学物質		保存条件		
	組成	CUBH/l	平均粒子径 μm	平均粒子径 μm		No.	有無	固形物 g/l	25℃ g/l	37℃ g/l
1) 出液	00/98/1	0.42	1	比較	有無	—	100	0.08	86	0.10
2) 本液	00/98/1	0.42	1	比較	有無	—	120	0.05	119	0.07
3) 本液	00/98/1	0.42	1	比較	有無	—	127	0.05	125	0.07
4) 本液	00/98/1	0.42	1	比較	有無	—	124	0.05	121	0.07
5) 本液	00/98/1	0.42	2	比較	有無	—	121	0.05	119	0.07
6) 本液	00/98/2	0.42	2	比較	有無	—	116	0.05	115	0.07
7) 本液	00/98/3	0.42	2	比較	有無	—	116	0.05	115	0.07
8) 本液	00/98/1	0.42	3	比較	有無	—	122	0.05	112	0.07
9) 本液	00/98/2	0.42	3	比較	有無	—	122	0.05	112	0.07
10) 本液	00/98/1	0.42	3	比較	有無	—	126	0.04	126	0.06
11) 本液	00/98/2	0.42	4	比較	有無	—	136	0.04	135	0.05
12) 本液	00/98/2	0.42	4	比較	有無	—	137	0.04	136	0.05
13) 本液	00/97/3	0.42	4	比較	有無	—	135	0.04	134	0.05
14) 本液	00/98/1	0.42	6	比較	有無	—	142	0.04	140	0.05
15) 本液	00/98/2	0.42	6	比較	有無	—	140	0.04	138	0.05
16) 本液	00/97/3	0.42	8	比較	有無	—	146	0.04	144	0.05
17) 本液	88/01/1	0.42	8	比較	有無	—	146	0.04	144	0.05
18) 本液	88/01/1	0.42	1.0	比較	有無	—	146	0.04	144	0.05
19) 本液	97/03/1/2	0.42	1.2	比較	有無	—	146	0.04	144	0.05
20) 本液	97/03/1/1	0.42	1.5	比較	有無	—	146	0.04	144	0.05
21) 本液	97/03/1/1	0.42	2.1	比較	有無	—	146	0.04	144	0.05
22) 本液	97/03/1/2	0.42	2.5	比較	有無	—	146	0.04	144	0.05
23) 本液	97/03/1/2	0.42	3.6	比較	有無	—	146	0.04	144	0.05
24) 本液	88/01/1/1	0.42	1.0	比較	有無	—	146	0.04	144	0.05
25) 本液	97/01/1/2	0.42	1.2	比較	有無	—	146	0.04	144	0.05
26) 本液	97/01/1/1	0.42	1.5	比較	有無	—	146	0.04	144	0.05
27) 本液	97/01/1/1	0.42	2.1	比較	有無	—	146	0.04	144	0.05
28) 本液	97/01/1/2	0.42	2.5	比較	有無	—	146	0.04	144	0.05
29) 本液	96/01/2	0.42	3.6	比較	有無	—	146	0.04	144	0.05

試料 No.	化学増感剤 化合物 No.	コロイド微粒子 又は 複合物	保存条件					
			25℃、3日			60℃、3日		
			耐傷性	感度	カブリ	耐傷性	感度	カブリ
(1) 比較	比較	無	1	100	0.07	1	86	0.10
(2) 比較	比較	コロイドシリカ	3	100	0.05	3	86	0.08
(3) 本発明	4	(1)	4	185	0.05	4	155	0.06
(4) 本発明	5	(2)	4	184	0.05	4	153	0.06
(5) 本発明	7	(3)	4	168	0.05	4	155	0.06
(6) 本発明	13	(4)	4	168	0.05	4	155	0.06
(7) 本発明	24	コロイドシリカ	4	166	0.05	4	164	0.06
(8) 本発明	36	(1)	4	182	0.05	4	161	0.06
(9) 本発明	27	(2)	4	168	0.04	4	188	0.05
(10) 本発明	44	(3)	4	186	0.04	4	156	0.05
(11) 本発明	51	(4)	4	167	0.04	4	166	0.05

[0138] When concomitant use of the sensitizer of this invention, colloidal silica, or its composite is carried out, damage resistance improves and it turns out that fogging of sensibility is also highly low.
 [0139] Sequential painting of the reflected light absorption layer of the following presentation on the base material which carried out the under coat of the example 4 gelatin, a high sensitivity emulsion layer, an interlayer, a low sensibility emulsion layer, and the emulsion protective layer was carried out.
 [0140]

(A reflected light absorption layer -453nm absorbance is 0.28)
 Polymethylmethacrylate mat agent (mean particle diameter of 2 micrometers)
 0.02 g/m² 4-[4-JI (methyl) amino benzylidene-1-IRU]-3-carboxy ethyl-1-[(4-carboxylic acid) phenyl]
 pyrazolone particle disperse dye with a mean particle diameter of 0.06micro 0.115 g/m² (high sensitivity emulsion layer)

1.2xten - six mols of sodium thiosulfates per one mol of silver, 2.6xten - six mols of chlorauric acid, The chloro-bromide emulsion which added 1xten - four mols of Na₃Ru(NO) Cl₅ compounds per one mol of silver inside the mean particle diameter of 0.11 micrometers which carried out chemical sensitization by -six mols, and chemical-sensitizer 5.6x10 content [silver chloride] % and the particle of 98 mols given in Table 4 (Amount with silver) 1.5g/m² Gelatin 1 g/m² Polyethylene-butylene copolymer latex (weight average molecular weight 125,000)

0.5 g/m² redox compound: -- with a mean particle diameter of 0.12 micrometers 1which carried out solid-state distribution-(5-nitroindazole-1-IRU)- 2-{4-[2-(2, 4-G tert pentyl phenoxy) butyl amide] phenyl} hydrazine 0.02g /, one mol of silver High contrast-ized assistant: Screw (1-piperidyl TORIECHIREN oxide) thioether 0.2g / one mol of silver Nonyl FENOKISHIDOKOSA ethyleneoxide sulfonate sodium salt 0.2g / one mol of silver Fogging inhibitor: Hydroquinone mono-sulfonate 12mg / one mol of silver Hydroquinone aldoxime 12mg / one mol of silver 1-(p-carboxyphenyl)-5-mercapto tetrazole 12mg / one mol of silver Benzotriazol 12mg / one mol of silver 1-butane sulfonic acid -2, 3-dithia cyclohexane 12mg / one mol of silver Adenine 12mg / one mol of silver Gallic-acid butyl 12mg / one mol of silver Thickener: Polystyrene sulfonate (weight average molecular weight 500,000) 0.1 g/m² Styrene 40-maleic-acid 60 copolymer (weight average molecular weight 145,000 - a suffix express mole ratio) 0.1g/m² Polyvinyl pyrrolidone (weight average molecular weight 285,000) 0.5 g/m² (interlayer)

Gelatin 0.3g/m² Spreading assistant: Nonyl phenoxy sulfonate sodium salt 12mg/m² (low sensibility emulsion layer)

The chloro-bromide emulsion which added 2.4xten - four mols of Na₃Ru(NO) Cl₅ compounds per one mol of silver inside the mean particle diameter of 0.06 micrometers which carried out sensitization like the high sensitivity emulsion, and silver chloride content % and the particle of 98 mols (Amount with silver) 1.5 g/m² Gelatin 1 g/m² polyethylene-butylene copolymer latex (above) 0.5 g/m² redox compound: -- with a mean particle diameter of 0.12 micrometers 1which carried out solid-state distribution-(4-nitroindazole-1-IRU)- 2-{4-[2-(2, 4-G tert pentyl phenoxy) butyl amide] phenyl} hydrazine 0.02g /, one mol of silver High contrast-ized assistant: Screw (1-piperidyl TORIECHIRENOKISASA id) thioether 0.2g / one mol of silver Nonyl FENOKISHIDOKOSA ethyleneoxide sulfonate sodium salt 0.2g / one mol of silver Fogging inhibitor: Hydroquinone mono-sulfonate 12mg / one mol of silver Hydroquinone aldoxime 12mg / one mol of silver 1-(p-carboxyphenyl)-5-mercapto tetrazole 12mg / one mol of silver 5-methyl-benzotriazol 12mg / one mol of silver 1-butane sulfonic acid -2, 3-dithia cyclohexane 12mg / one mol of silver Adenine 12mg / one mol of silver Gallic-acid butyl ester 12mg / one mol of silver Thickener: Polystyrene sulfonate (above) 0.1g/m² Styrene-maleic-acid copolymer (above) 0.1g/m² Polyvinyl pyrrolidone (above) 0.5 g/m² (emulsion protective layer) Gelatin 0.5 g/m² Pori (ethyl acrylate 98-acrylic acid 2) latex (weight average molecular weight 230,000 - a suffix express a mole ratio) 0.2 g/m² Silicon-dioxide mat agent (mean particle diameter of 4 micrometers) 0.03 g/m² The particle distribution infrared color 4 with a mean particle diameter of 0.06 micrometers, 4'-screw [1-(4-

KARUBOKI phenyl)-3-carboxy ethyl pyrazole-5-on] hepta-methine 60 mg/m² Fogging inhibitor : [Particle distribution 4-nitroindazole with a mean particle diameter of 0.07 micrometers] As shown in Table 4 at a 60 mg/m² high-sensitivity emulsion layer and a low sensibility emulsion layer, the phosphonium compound or the bis-pyridinium compound was added as a high contrast-ized agent, and 2.6x10⁻³ mols /, and one mol of silver was added as a hydrazine or a tetrazolium compound, and an accelerator, respectively. The sensibility difference of a high sensitivity emulsion and a low sensibility emulsion was 87%. It added and hardening agent morpholino carbamoyl pyridine ethane sulfonic acid was applied to the reflected light absorption layer so that it might become with 0.27 millimols per gelatin 1g to the gelatin of all layers. [0141] The next evaluation was performed by the sample immediately after obtaining, and the sample left at 55 degrees C for 72 hours after carrying out gas conditioning by 23 degrees C and 70%RH for 24 hours. [0142] <<remaining color>> What carried out the development of the sample with unexposed was used, and five five-step viewing organic-functions relative evaluation was performed for the piece of a film in piles on the blank paper. That is, five ranks are the best and one rank is the worst. [0143] <<*****>> After returning by sticking the return manuscript with which it extracts with a sample and the alphabetic character evaluation sample is mounted, using the developer and the fixer of the same presentation as an example 1, for 6 seconds, it performed for 6 seconds at 25 degrees C of rinsings for 6 seconds, 28 degrees C of development performed processing for 6 seconds at 60 degrees C of desiccation at 28 degrees C of fixing, and the auto-processor estimated five steps of visibility of the edge of the halftone dot of the obtained image. An edge carries out a rank 5 most distinctly and ill-behaved ***** is [a rank / a smooth thing and a rank 1] also of inferior quality. [0144] << -- omission alphabetic character property>> -- visual observation was carried out and the 10 times as many magnifier as this estimated five steps of Mincho alphabetic characters of seven points which extract and come out into a halftone dot. The alphabetic character of 1 was indistinct on the level on which 5 is reproducing the manuscript completely, and the worst thing of manuscript recall and 3 were taken as practical limit level. [0145] A result is shown in Table 4.

[0146]

[Table 4]

試料 No.	化学増感剤		硬化剤		足通制		無処理			
	No.	品名	No.	品名	No.	品名	なし		あり	
							点	質	色	文字
(1) 比較	1	無	1	無	1	無	1	1	1	1
(2) 比較	2	無	2	無	2	無	1	1	1	1
(3) 比較	3	無	3	無	3	無	1	1	1	1
(4) 比較	4	無	4	無	4	無	2	2	2	2
(5) 比較	5	無	5	無	5	無	2	2	2	2
(6) 比較	6	無	6	無	6	無	2	2	2	2
(7) 比較	7	無	7	無	7	無	2	2	2	2
(8) 本発明	8	無	8	無	8	無	3.5	3.5	3.5	3.5
(9) 本発明	9	無	9	無	9	無	4	4	4	4
(10) 本発明	10	無	10	無	10	無	4	4	4	4
(11) 本発明	11	無	11	無	11	無	4	4	4	4
(12) 本発明	12	無	12	無	12	無	4	4	4	4
(13) 本発明	13	無	13	無	13	無	4	4	4	4
(14) 本発明	14	無	14	無	14	無	4	4	4	4
(15) 本発明	15	無	15	無	15	無	4	4	4	4
(16) 本発明	16	無	16	無	16	無	4	4	4	4
(17) 本発明	17	無	17	無	17	無	4	4	4	4
(18) 本発明	18	無	18	無	18	無	5	5	5	5
(19) 本発明	19	無	19	無	19	無	5	5	5	5
(20) 本発明	20	無	20	無	20	無	5	5	5	5

[0147] It turns out that sensitization is carried out by the sensitizer of this invention, it will extract if the hydrazine compound of a high contrast-ized agent, the bis-pyridinium compound of a high contrast-ized accelerator, or a phosphonium compound is used, and it excels in alphabetic character quality and a remaining color, ****, and thermal resistance.

[0148] Except having added the disulfide compound of a sensitizer and equimolar at the time of example 5 chemical sensitization, as shown in Table 5, the silver halide emulsion was prepared like sample No.12 of an example 1, and it evaluated like the example 1 about sensibility and fogging. The result is shown in Table 5.

[0149]

[Table 5]

試料 No.	化学増感剤 化合物 No.	シニャイト 化合物 No.	保存条件			
			25℃、3日		60℃、3日	
			感度	ｶﾞﾘ	感度	ｶﾞﾘ
(1) 比較	比較	無	100	0.07	86	0.10
(2) 本発明	1	無	140	0.06	138	0.06
(3) 本発明	2	1	147	0.03	145	0.04
(4) 本発明	5	1	144	0.03	141	0.04
(5) 本発明	8	2	141	0.03	139	0.04
(6) 本発明	12	2	148	0.03	145	0.04
(7) 本発明	23	3	145	0.03	142	0.04
(8) 本発明	34	3	142	0.03	140	0.04
(9) 本発明	36	5	148	0.03	148	0.04
(10) 本発明	46	5	146	0.03	146	0.04
(11) 本発明	52	5	147	0.03	146	0.04
(12) 本発明	56	5	145	0.03	144	0.04
(13) 本発明	57	4	142	0.03	140	0.04
(14) 本発明	24	4	140	0.03	138	0.04
(15) 本発明	16	5	148	0.03	144	0.04

[0150] When the sensitizer and disulfide compound of this invention are used together, it turns out that the effectiveness of this invention is demonstrated notably.

[0151] Except having added the sensitizer and the oxidizer of equimolar at the time of example 6 chemical sensitization, as shown in Table 6, the silver halide emulsion was prepared like sample No.13 of an example 2, and it evaluated like the example 1 about sensibility and fogging. The obtained result is shown in Table 6.

[0152]

[Table 6]

試料 No.	化学増感剤 化合物 No.	酸化剤 化合物 No.	保存条件			
			25℃、3日		60℃、3日	
			感度	ｶﾞﾘ	感度	ｶﾞﾘ
(1) 比較	比較	無	100	0.07	86	0.10
(2) 本発明	1	無	120	0.05	116	0.06
(3) 本発明	3	(1)	147	0.02	145	0.04
(4) 本発明	5	(1)	144	0.02	141	0.04
(5) 本発明	8	(2)	141	0.02	134	0.04
(6) 本発明	12	(2)	148	0.02	145	0.04
(7) 本発明	23	(3)	145	0.02	142	0.04
(8) 本発明	34	(3)	142	0.02	140	0.04
(9) 本発明	36	(5)	146	0.02	146	0.04
(10) 本発明	46	(8)	146	0.02	146	0.04
(11) 本発明	52	(8)	147	0.02	146	0.04
(12) 本発明	56	(8)	145	0.02	144	0.04
(13) 本発明	57	(4)	142	0.02	140	0.04
(14) 本発明	24	(4)	140	0.02	138	0.04
(15) 本発明	16	(8)	146	0.02	144	0.04

[0153] When the sensitizer and oxidizer of this invention are used together, it turns out that the effectiveness of this invention is demonstrated notably.

[0154] Corona discharge treatment (alternating current sine wave form discharge frequency [of 30kHz] and path clearance 1.5mm, 0.36 kV-A and a part / m2) was performed to both sides of the polyethylene terephthalate base material by which example 72 shaft extension was carried out, and the vinylidene chloride, the methyl methacrylate, and the weight ratio of an acrylic acid applied the copolymer which is the ratio of 90:8:2 by the thickness of 0.3 micrometers, dried in the dry-bulb temperature of 180 degrees C, and 56 seconds, and formed the glue line. Conductive metallic oxide was applied to these both sides. The metal particle shown in the table 7 with a mean particle diameter of 67nm as conductive metallic oxide was included in alkali treatment gelatin 36% of the weight, gelatin was attached, the amount was applied on said glue line so that it might become 1.2 g/m2, and it dried in the dry-bulb temperature of 160 degrees C, and 48 seconds. In addition, the dura mater of gelatin is 0.22 millimol ***** per gelatin 1g about 1 and 3-divinyl sulfonyl-2-propanol. The sensitive material which applied the emulsion of sample No.20 of an example 1 on this under coat was produced.

[0155] After leaving each sample in 23 degrees C and the room of 16%RH for 24 hours, evaluation conductive by dust adhesion was carried out.
 [0156] <<dust adhesion trial>> 5 and the almost attached level were evaluated for the level which is not attached at all in whenever [combustion ashes' of tobacco when detaching piece's of film 10cm's, after carrying out frictional electrification's by neoprene platen 5 times' adhesion] as 1. The practical limit was made into the level of 3.

[0157]

[Table 7]

試料 No.	化学増感剤 化合物 No.	金属鹽化物 化合物 No.	保存条件					
			25℃、3日			60℃、3日		
			感度	α7'リ	導電性	感度	α7'リ	導電性
(1) 比較	比較	無	100	0.07	1	86	0.10	1
(2) 本発明	1	無	120	0.06	2	128	0.06	2
(3) 本発明	3	(1)	137	0.03	5	125	0.03	5
(4) 本発明	5	(1)	134	0.03	5	131	0.03	5
(5) 本発明	8	(2)	131	0.03	5	119	0.03	5
(6) 本発明	12	(2)	138	0.03	5	135	0.03	5
(7) 本発明	23	(3)	145	0.03	5	142	0.03	5
(8) 本発明	24	(3)	142	0.03	5	140	0.03	5
(9) 本発明	36	(4)	138	0.04	5	138	0.03	5
(10) 本発明	38	(4)	136	0.04	5	136	0.04	5
(11) 本発明	32	(4)	137	0.04	5	136	0.04	5
(12) 本発明	41	(5)	135	0.04	4	134	0.04	4
(13) 本発明	47	(5)	132	0.04	4	130	0.04	4
(14) 本発明	46	(5)	130	0.04	4	128	0.04	4
(15) 本発明	47	(6)	138	0.04	4	134	0.04	4

[0158] When the sensitizer and conductive metallic oxide of this invention are used together, sensibility is high, fogging is low, and it turns out that it excels in conductivity and thermal resistance.
 [0159] The orthochromatic sensitive material for example 8 roentgenography was created, and the photograph engine performance and physical properties were evaluated.
 [0160] After carrying out corona discharge treatment to both sides of the polyethylene terephthalate base material with a thickness of 175 micrometers colored blue by alternating current sine wave form discharge frequency [of 30kHz], and path clearance 1.5mm, 0.36 kV-A and a part / m2, styrene 40-butadiene 57-acrylonitrile 3 copolymer (a suffix expresses a mole ratio.) was further applied by the thickness of 0.3 micrometers. The antistatic layer containing a metallic-oxide particle was painted on this glue line, the crossing light filter layer, emulsion layer, and protective layer (especially, as long as there is no notice, mg/m2 shows an addition.) of the following presentation were applied, respectively, and the sample was created. The metallic oxide used the thing of said example 3.

[0161]

The 1st layer (crossing light filter layer)

Particle distribution object of a color given in Table 8 120 (distributing the solid-state particle dispersing element of a color using the high-speed impeller disperser, degree of dispersion of mean particle diameter of particle size was less than 5% in coefficient of variation at 0.1 micrometers.)
 A silica (SiO₂ - mean particle diameter of 3 micrometers) 6 C₁₂H₂₅O(CH₂CH₂O)₁₂H 7
 C₁₂H₂₅O(CH₂CH₂O)₂SO₃Na 4 C₁₇H₃₃CON(CH₃) CH₂CH₂SO₃Na 3
 C₉H₁₉C₆H₄O[CH₂CH(CH₂OH)]₁₂OH 3 Polyethylacrylate latex (weight average molecular weight 500,000)
 10 Sodium polystyrene sulfonate (weight average molecular weight 500,000) 20 N-methyl iso thiazole-3-ON 2
 Gelatin The 120 2nd layer (low sensibility emulsion layer)
 The silver halide emulsion which consists of a with an aspect ratio 3, and a silver chloride content mean particle diameter [% and mean particle diameter of 0.38 micrometers of 98 mols] silver chlorobromide monotonous particle is produced. 5 and 5'-dichloro-9-ethyl -3, 3-screw (3-sulfopropyl)-OKISA carbocyanine sodium salt (1.6x10 -four mols /, one mol of silver) 1 And 3-diethyl-6-TORIFURORO methyl-2-[3-(1, 3-diethyl-6-TORIFURORO methyl)-1 and 3-dihydro-2H-Benz imidazole-2-ylidene-1-propenyl] 1H-Benz imidazolium (3.3x10 -five mols /, one mol of silver), It is 4-hydroxy-6-methyl as a stabilizer. - 1, 3, 3a, and a 7-tetraaza indene (1.2x10 -four mols /, one mol of silver) were added. Sensitization of the 1.4xten - six mols was carried out to 2xten - six mols of sodium thiosulfates per one mol of silver, 3.2xten - four mol of KCN(s), 2.6xten - six mols of chloroauric acid, and Table 8 using the sensitizer of a publication. Gelatin and silver were attached and the amount added the further following additive as 1.3 g/m2 and 1.4 g/m2, respectively.
 [0162]

C₉H₁₉C₆H₄ (CH₂CH₂O)₁₂-SO₃Na 13 C₄H₉OCH₂CH(OH) CH₂N₂ (COCH₃) 16 Polyethylacrylate latex (above) 500 Colloidal silica (mean particle diameter of 60nm) 38 Reduction processing glucose (weight average molecular weight 880) 46 Dextran 34 Hydroquinone sulfonate 23 1-(p-acetamide phenyl)-5-mercapto tetrazole 6 5-methyl benzotriazol 4 Polyvinyl pyrrolidone (average degree of polymerization 50) The 300 3rd layer (high sensitivity emulsion layer)

The silver halide emulsion which consists of a with an aspect ratio 3, and a silver chloride content mean particle diameter [% and mean particle diameter of 0.48 micrometers of 98 mols] silver chlorobromide monotonous particle is produced. 5 and 5'-dichloro-9-ethyl -3, 3-screw (3-sulfopropyl)-OKISA carbocyanine sodium salt (1.6x10⁻⁴ -four mols /, one mol of silver) 1 And 3 diethyl-6-TORIFURORO methyl-2-[3-(1, 3-diethyl-6-TORIFURORO methyl)-1 and 3-dihydro-2H-Benz imidazole-2-ylidene-1-propenyl] 1H-Benz imidazolium (3.3x10⁻⁵ -five mols /, one mol of silver), It is 4-hydroxy-6-methyl as a stabilizer. - 1, 3, 3a, and 7-TETORAZA indene (1.2x10⁻³ -three mols /, one mol of silver) were added. Sensitization of the 3.4xten - six mols was carried out to 3xten - six mols of sodium thiosulfates per one mol of silver, 4.2xten - four mol of KCN(s), 3.6xten - six mols of chlorauric acid, and Table 8 using the sensitizer of a publication. Gelatin and silver were attached and the amount was applied for the further following additive as 1.1 g/m² and 0.08 g/m², respectively. [0163]

C₉H₁₉C₆H₄ (CH₂CH₂O)₁₂-SO₃Na 13 C₄H₉OCH₂CH(OH) CH₂N₂ (COCH₃) 16 Polyethylacrylate latex (above) 500 Colloidal silica (above) 38 Reduction processing glucose (above) 46 Dextran 34 Hydroquinone sulfonate 23 1-(p-acetamide phenyl)-5-mercapto tetrazole 6 5-methyl benzotriazol 4 2, 5-thiadiazole The 1 4th layer (protective layer)

Polymethylmethacrylate mat agent (mean particle diameter of 3.5 micrometers) 12 C₉H₁₉C₆H₄(CH₂CH₂O)-SO₃Na 12 C₈F₁₇SO₃K 11 C₈F₁₇SO₂N(C₃H₇)-N(CH₂CH₂O)₁₀-(CH₂CH₂CH₂)₄H 11 C₈F₁₇SO₂N(C₃H₇)-N(CH₂CH₂O)₁₀-CH₂CH₂SO₃K 12 C₁₁H₁₂CONH(CH₂CH₂O)₅H 13 Polyvinyl pyrrolidone (average degree of polymerization 45) 200C₄H₉CH(C₂H₅) CH₂OCOCH₂CH(SO₃Na) COO-CH₂CH(C₂H₅) C₄H₉ 12 4 and 4'-screw [1-(4-carboxyphenyl)-3-carboxy ethyl pyrazole-5-on] hepta-methine 200 Gelatin Coincidence multistory [of the four layers from a 0.8 g/m² crossing light filter layer to a protective layer] was carried out by part for 356m/in rate with the curtain spreading machine, and they were applied. The dry-bulb temperature of 46 degrees C and below 20%RH performed decreasing drying within in 60 seconds. [0164] Gas conditioning of the created sample was carried out by 23 degrees C and 60%RH for 24 hours. Dividing each sample into two, one side performed the following evaluation immediately. Another side was sealed to the wrapping which intercepts moisture and air passage, it was saved for seven days and, similarly 55 degrees C estimated it.

[0165] <<sensibility and fogging>> After giving exposure for 0.1 seconds in green light, it processed using the processing liquid of the following presentation with the auto-processor. development -- the temperature of 35 degrees C -- 5 seconds and fixing -- for 3 seconds, for 3 seconds, rinsing was set at the temperature of 60 degrees C, and desiccation was set as 3 seconds at the temperature of 20 degrees C with the temperature of 25 degrees C. The inverse number of the light exposure which gives the concentration of fogging +1.0 was made into sensibility.

[0166]

(Developer presentation)

Hydroquinone 30g 1-phenyl-3-pyrazolidone 1.5g Isoascorbic acid 30.0g 5-nitroindazole 0.250g 5-methyl benzotriazol 0.06g Potassium bromide 3.0g Sodium sulfite 50g Potassium hydroxide 30g Boric acid 10g Water was added, it considered as 1l., and pH was adjusted to 10.20.

[0167]

(Fixer presentation)

An ammonium thiosulfate (72.5%) water solution 240ml Sodium sulfite 17g Sodium acetate and 3 monohydrate 6.5g Boric acid 6.0g A sodium citrate and 2 monohydrate 2.0g Acetic-acid (90%) water solution 13.6ml 7.4g of sulfuric-acid (50%) water solutions Aluminum sulfate (water solution whose aluminum₂O₃ conversion content is 8.1%) 26.5g Water was added, it considered as 1l., and pH was adjusted to 5.0. [0168] << -- sharp nature>> -- five steps were evaluated by viewing about the sharp nature of the image which carried out X-ray lithography and was obtained by carrying out a development through thorax fan TOMU, having set highest level to 5 and having used lowest level as 1. [0169] <<remaining color>> Visual observation of the five thickness of a color was carried out for the test piece of the 3cmx10cm magnitude which carried out the development with unexposed in piles, and transparency set level with lowest 5 and transparency to 1, and evaluated five steps of highest level. A rank 3 is practical limit level.

[0170]
[Table 8]

試料 No.	増感剤		染料	熱処理					
				なし			あり		
	低感度乳剤用 化合物 No.	高感度乳剤用 化合物 No.	乳剤下層添加 化合物 No.	感度	鮮鋭性	残色	感度	鮮鋭性	残色
(1) 比較	比較	比較	無	100	0.07	1	88	0.07	1
(2) 本発明	1	-	(1)	120	0.05	2	120	0.06	2
(3) 本発明	2	-	(2)	127	0.03	4	127	0.04	5
(4) 本発明	6	-	(6)	124	0.03	4	124	0.04	5
(5) 本発明	12	-	(8)	121	0.03	4	121	0.04	5
(6) 本発明	21	-	(10)	128	0.03	4	128	0.04	5
(7) 本発明	2	12	(1)	135	0.02	5	133	0.02	5
(8) 本発明	3	6	(2)	132	0.02	5	131	0.02	5
(9) 本発明	12	23	(6)	138	0.02	5	136	0.02	5
(10) 本発明	17	36	(8)	136	0.02	5	135	0.02	5
(11) 本発明	18	16	(5)	137	0.02	5	132	0.02	5
(12) 本発明	19	47	(4)	135	0.02	4	131	0.02	4

[0171] When sensitization is carried out using the sensitizer of this invention, it turns out that high sharp nature is obtained and a remaining color is not degraded.

[0172] The emulsion which becomes Table 9 from the cubic silver chloride particle of a publication like an example 4 was obtained except having doped 4.5xten - four mols per one mol of silver halides of example 9 transition-metals compounds. After carrying out chemical sensitization to Table 9 using the sensitizer of a publication, sensitive material was produced by the same lamination and same presentation as an example 4. The 100-micrometer transparent polyethylene terephthalate base material was inserted and stuck between the screens of the halftone dot of 175 lines per inch, each sample was exposed by the non-electrode ultraviolet-rays light source, it processed with the auto-processor, and KIRE of fogging and the leg was evaluated. Developer presentations are the developer of an example 1, and a fixer, and processing conditions were set as 60 degrees C of desiccation, and 3 seconds for 25 degrees C of rinsings, and 3 seconds for 28 degrees C of fixing, and 4

seconds for 28 degrees C of development, and 5 seconds. [0173] <<leg -- going berserk -->> -- the thing without a fringe was set to 5 about the fringe of the edge of a halftone dot, and the fringe evaluated as 1 that from which many halftone dots are software. [0174] A result is shown in Table 9.

[0175]

[Table 9]

試料 No.	感光性化銀乳剤			化学増感剤 化合物 No.	露光処理			
	組成	平均粒子径 μm	ト・フ・金属 化合物 No.		なし		あり	
					光7"リ	露部4レ	光7"リ	露部4レ
(1) 比較	60/39/1	0.11	(5)	比較	0.07	2	0.07	2
(2) 本発明	60/39/1	0.11	(5)	1	0.02	4	0.02	4
(3) 本発明	60/39/1	0.11	(5)	3	0.02	4	0.02	4
(4) 本発明	60/39/1	0.11	(5)	5	0.02	4	0.02	4
(5) 本発明	70/39/1	0.11	(8)	8	0.02	6	0.02	5
(6) 本発明	70/29/2	0.12	(8)	12	0.02	5	0.02	5
(7) 本発明	70/27/3	0.13	(12)	23	0.02	6	0.02	5
(8) 本発明	70/29/1	0.11	(13)	34	0.02	6	0.02	5
(9) 本発明	70/28/2	0.12	(13)	33	0.02	4	0.02	4
(10) 本発明	82/08/0	0.10	(24)	46	0.03	4	0.03	4
(11) 本発明	85/03/2	0.12	(24)	12	0.03	4	0.03	4
(12) 本発明	88/02/0	0.10	(24)	16	0.03	4	0.03	4
(13) 本発明	89/01/0	0.10	(16)	17	0.03	4	0.03	4
(14) 本発明	00/98/2	0.12	(16)	16	0.03	4	0.03	4
(15) 本発明	00/97/3	0.13	(23)	26	0.03	4	0.03	4

[0176] When a transition metal complex is doped and the sensitizer of this invention is used, it turns out that the good photograph property that fogging is low sharp is acquired.

[0177] The same antistatic layer as example 10 example 8 which contains a metallic-oxide particle on a glue line carried out sequential painting of a reflected light absorption layer, a high sensitivity emulsion layer, an interlayer, a low sensibility emulsion layer, and the emulsion protective layer on the base material applied to both sides.

[0178]

The 1st layer (reflected light absorption layer) a polymethylmethacrylate mat agent (mean particle diameter of 2micro) -- 0.025g/m2 mean particle diameter -- 0.06 -- micro -- a particle -- distribution -- having carried out -- four - [-- four - JI (methoxymethyl) -- amino -- FURIRIDEN - one - IRU --] - three - carboxy -- ethyl --] -- pyrazolone dye -- 120 mg/m2 Gelatin 0.25 g/m2 -- the 2nd layer (high sensitivity emulsion layer) 1.2xten - six mols of sodium thiosulfates per one mol of silver, 2.4xten - seven mol of KCN(s), 6.7xten - six mols of chloroauric acid, the chloro-bromide emulsion which added 1xten - four mols of Na3Ru(NO) Cl5 compounds for the sensitizer given in Table 10 per one mol of silver inside the mean particle diameter of 0.12 micrometers which added -six mols and carried out sensitization, and 3.4x10 content [silver chloride] % and the particle of 98 mols (Amount with silver) 1.5g/m2 Gelatin 1 g/m2 Polyethylene-butylene copolymerization latex (weight average molecular weight 165,000) 0.5 g/m2 High contrast-ized agent : [Solid-state distribution 1-TORIFURORO methyl-2-{4-[2-(2, 4-G tert phenoxy) sulfonamide] phenyl} hydrazine with a mean particle diameter of 0.12 micrometers] 0.02g / one mol of silver Redox compound : [Solid-state distribution 1-(5-nitroindazole-1-IRU)-2-{4-[2-(2, 4-G tert pentyl phenoxy) butyl amide] phenyl} hydrazine with a mean particle diameter of 0.12 micrometers] 0.02g / one mol of silver High contrast-ized assistant: Screw (1-piperidino TORIECHIREN oxide) thioether 0.36g / one mol of silver Nonyl FENOKISHIDOKOSA ethyleneoxide sulfonate sodium salt 0.2g / one mol of silver Fogging inhibitor: Hydroquinone mono-sulfonate 12mg / one mol of silver Hydroquinone aldoxime 12mg/silver 1 mol 1-(p-carboxyphenyl)-5-mercapto tetrazole 12mg / one mol of silver Benzotriazol 12mg / one mol of silver 1-butane sulfonic acid -2, 3-dithia cyclohexane 12mg / one mol of silver Adenine 12mg / one mol of silver Gallic-acid butyl 12mg / one mol styrene 44of silver-maleic-acid 56 copolymer Thickener: Polystyrene sulfonate (weight average molecular weight 500,000) (weight average molecular weight 365,000 - a suffix express a mole ratio.) 0.1g/m2 0.1 g/m2 Polyvinyl pyrrolidone (weight average molecular weight 158,000) 0.5g/m2 -- the 3rd layer (interlayer) gelatin 0.26 g/m2 Dodecylbenzene sulfonate sodium salt 6 mg/m2 -- the 4th layer (low sensibility emulsion layer) 2.2xten - six mols of sodium thiosulfates per one mol of silver, 3.4xten - seven mol of KCN(s), 7.7xten - six mols of chloroauric acid, the chloro-bromide emulsion which added 2.4xten - four mols of Na3Ru(NO) Cl5

compounds for the sensitizer given in Table 10 per one mol of silver inside the mean particle diameter of 0.06 micrometers which added -six mols and carried out sensitization, and 4.4x10 content [silver chloride] % and the particle of 98.4 mols (Amount with silver) 1.5 g/m2 Gelatin 1g/m2 Polyethylene-butylene copolymerization latex (above) 0.5 g/m2 High contrast-ized agent : [Solid-state distribution 1-TORIFURORO methyl-2-{4-[2-(2, 4-G tert phenoxy) sulfonamide] phenyl} hydrazine with a mean particle diameter of 0.12 micrometers] 0.02g / one mol of silver Redox compound : [Solid-state distribution 1-(5-nitroindazole-1-IRU)-2-{4-[2-(2, 4-G tert pentyl phenoxy) butyl amide] phenyl} hydrazine with a mean particle diameter of 0.12 micrometers] 0.02g / one mol of silver High contrast-ized assistant: Screw (1-piperidino TORIECHIRENOKISASA id) thioether 0.36g / one mol of silver Nonyl FENOKISHIDOKOSA ethyleneoxide sulfonate sodium salt 0.2g / one mol of silver Fogging inhibitor: Hydroquinone mono-sulfonate 12mg / one mol of silver Hydroquinone aldoxime 12mg / one mol of silver 1-(p-carboxyphenyl)-5-mercapto tetrazole 12mg / one mol of silver 5-methyl-benzotriazol 12mg / one mol of silver 1-butane sulfonic acid -2, 3-dithia cyclohexane 12mg / one mol of silver Adenine 12mg / one mol of silver Gallic-acid butyl 12mg / one mol of silver Thickener: Polystyrene sulfonate (above) 0.1g/m2 Styrene-maleic-acid copolymer (above) 0.1 g/m2 Polyvinyl pyrrolidone (above) 0.5 g/m2 -- the 4th layer (emulsion protective layer)

Gelatin 0.5g/m2 Pori (ethyl acrylate 98-acrylic acid 2) latex (above) 0.2 g/m2 Silicon-dioxide mat agent (mean particle diameter of 4 micrometers) 0.03 g/m2 Particle color given in Table 10 0.13 g/m2 (what mean particle diameter set to 0.08 micrometers using the sand mill disperser) The sensibility difference of a high sensitivity emulsion and a low sensibility emulsion was 0.36 in the opposite numeral. Moreover, it added and the morpholino carbamoyl pyridine ethane-sulfonic-acid hardening agent was applied to the reflected light absorption layer so that it might become with 0.27 millimols per gelatin 1g to the gelatin of all layers.

[0179] Each produced sample was carried out for 2 minutes, respectively, after carrying out gas conditioning of one side by 23 degrees C and 70%RH for 24 hours, it was left for 72 hours and 55 degrees C and 52%RH estimated it.

[0180] <<safe light nature>> Distance was adjusted, the test sample was left for 20 minutes so that it might become 300 luxs under a 200W fluorescent lamp, the fogging concentration after it performed at 25 degrees C of rinsings and 28 degrees C of development perform ***** for 6 seconds at 60 degrees C of desiccation for 6 seconds for 6 seconds for 6 seconds at 28 degrees C of fixing was measured using the auto-processor, and five-step evaluation was performed on the following criteria. In addition, the developer and the fixer used the thing of an example 1.

[0181] 5: fogging concentration <=0.0054:0.005 -- <-- fogging <=0.013:0.01< fogging concentration <=0.022 -- after returning by sticking the return manuscript with which the :0.02 <fogging concentration <=0.21:fogging concentration> 0.2 <<omission alphabetic character>> omission alphabetic character evaluation sample is mounted, the development was carried out similarly. It extracted, and the alphabetic character property carried out visual observation, and evaluated five steps of Mincho alphabetic characters of seven points which extract and come out into a halftone dot by the 10 times as many magnifier as this.

[0182] <<remaining color>> What carried out the development of each sample with unexposed was used, and five five-step viewing organic-functions relative evaluation was performed for the piece of a film in piles on the blank paper. That is, five ranks are the best and one rank is the worst.

[0183]

[Table 10]

試料 No.	増感剤		染料		乾燥度			
	低感度乳剤用		高感度乳剤用 (保護層添加)		なし		あり	
	化合物 No.	比較	化合物 No.	比較	排字文字	排字文字	排字文字	排字文字
(1) 比較	比較	比較	無	比較	1	1	1	1
(2) 本発明	1	1			2	2	2	2
(3) 本発明	2	2	(2)		4	4	4	4
(4) 本発明	5	6	(6)		4	4	4	4
(5) 本発明	17	12	(8)		4	4	4	4
(6) 本発明	17	21	(12)		4	4	4	4
(7) 本発明	17	12	(2)		4	4	4	4
(8) 本発明	2	6	(2)		4	4	4	4
(9) 本発明	18	23	(7)		5	5	5	5
(10) 本発明	18	36	(5)		5	5	5	5
(11) 本発明	19	16	(2)		5	5	5	5
(12) 本発明	19	47	(4)		4	4	4	4

[0184] When the sensitizer and particle color of this invention are used together, it excels in safe light nature, and it extracts and it turns out that there are few remaining colors after alphabetic character quality and high-humidity/temperature preservation.

[0185]

[Effect of the Invention] According to this invention, the high sensitivity of silver halide photosensitive material, low fogging, and high contrast and good shelf life can be acquired.

[Translation done.]